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CODY

Resource Management Plan
Draft Environmental Impact Statement

DRAFT
Resource Management Plan
and
Environmental Impact Statement
for the
Cody Resource Area
Worland District, Wyoming

Lead Agency: U.S. Department of the Interior, Bureau of Land Management

Type of Action: Administrative

Jurisdiction: Portions of Big Horn and Park counties, Wyoming

Abstract: This document addresses alternatives for managing almost 1.l million acres of federal land and about 1.5 million acres of federal mineral estate administered by the Cody Resource Area, Worland District, Bureau of Land Management (see map 1). The plan focuses on three resource management issues relating to vegetative resources, special management area designations, and resource accessibility and manageability.

Four alternatives that address each issue have been considered: continuation of present management (Alternative A) and three other alternatives that provide a variety of choices ranging from restricting management actions or development to actively mitigating the effects of resource management actions or development. The preferred alternative (D) is a combination of Alternatives A, B, and C. The four alternative plans presented in chapter 2 focus on allocating resources among the uses and prescribing general management actions that would be taken. The impacts that would be expected from implementing each of the alternatives are analyzed in chapter 4 and summarized in table 4 at the end of chapter 2.

The plan, when produced in final form, will provide a comprehensive framework for managing and allocating resources on public land in the Cody Resource Area. Further information regarding this draft RMP/EIS can be obtained from the address below. Comments will be accepted for 90 days following the date that the Environmental Protection Agency publishes the notice of filing of this draft in the *Federal Register.* Comments should be sent to the following address:

Bob Ross, Team Leader
Bureau of Land Management
Cody Resource Area
P.O. Box 518
Cody, Wyoming 82414
Telephone: (307) 527-2216

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
WYOMING STATE OFFICE
P.O. BOX 1828
CHEYENNE, WYOMING 82003

Feburary 1988

Dear Reader:

We present this *Draft Resource Management Plan/Environmental Impact Statement for the Cody Resource Area* for your review and comment. The alternatives in this document have been designed to resolve land management issues that were identified in the early stages of the planning process. The environmental consequences of implementing the alternatives also are analyzed in the document.

Your comments are invited on the alternatives presented and on the adequacy of the impact analysis. A 90-day comment period will begin with the date the Environmental Protection Agency (EPA) publishes the filing of this draft document in the *Federal Register*. Please direct your written comments to Bob Ross, Team Leader, P.O. Box 518, Cody, Wyoming 82414. It will be helpful if comment letters include a subject line referring to "Cody RMP/EIS."

You should retain this draft document because it is possible that the final RMP/EIS will be published in abbreviated form. If that occurs, you will need this document for reference.

Comments on the alternatives and on the adequacy of the impact analyses will be fully considered and evaluated in development of the final RMP/EIS. Through your participation in this effort, we can move forward together toward a common goal of improved public land management in the Cody Resource Area.

Sincerely,

Hillary A. Oden
State Director

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RESOURCE MANAGEMENT PLAN/ENVIRONMENTAL IMPACT STATEMENT for the CODY RESOURCE AREA WORLAND DISTRICT, WYOMING

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Prepared by:

U.S. Department of the Interior
Bureau of Land Management
Worland, Wyoming
1988

Wyoming State Director

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SUMMARY

INTRODUCTION

This draft resource management plan/ environmental impact statement (RMP/EIS) addresses future management options for approximately 1,081,000 acres of public land surface and 1,508,000 acres of federal mineral estate administered by the Bureau of Land Management (BLM) through its Cody Resource Area in Cody, Wyoming. The Cody Resource Area encompasses parts of Big Horn and Park counties in north central Wyoming (see map 1).

When completed, the plan will provide a framework for managing the public lands and resources and allocating their uses in the resource area. Specifically, this RMP/EIS is focused on resolving three key resource management issues: vegetative resources (how should vegetation be managed and allocated to consumptive and nonconsumptive uses?); special management area designation (what values or resources warrant management priority and emphasis under special management designations?); and resource accessibility and manageability (how can public lands and resources be managed to allow for appropriate types and levels of use or to provide protection, if needed?).

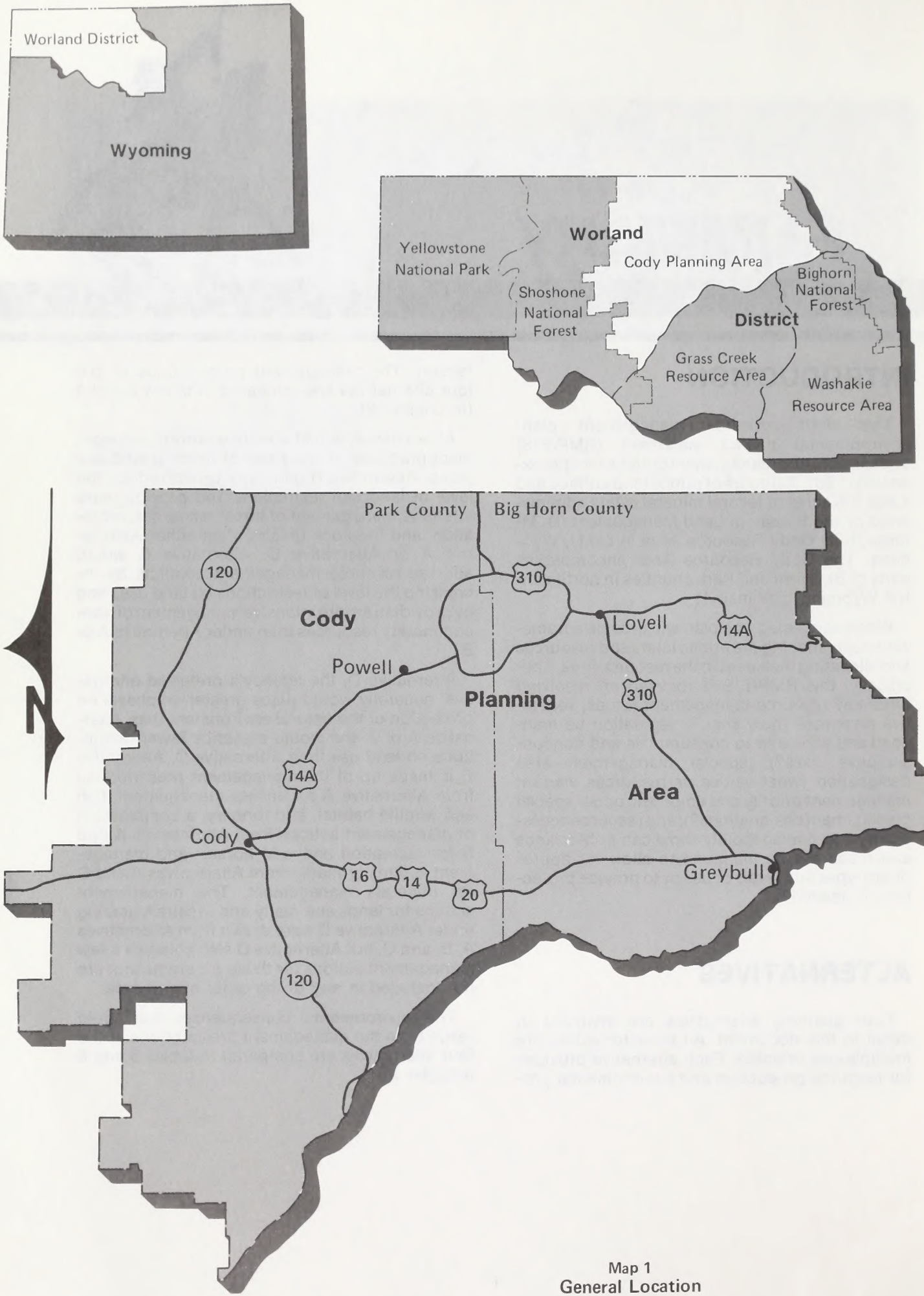
ALTERNATIVES

Four planning alternatives are analyzed in detail in this document. All the alternatives are multiple-use oriented. Each alternative provides for resource production and environmental protection. The management prescriptions of the four alternatives are compared in tables 2 and 4 (in chapter 2).

Alternative A would continue current management practices on the basis of existing land use plans. Alternative B generally would reduce the level of land use restrictions and provide more intensive management of forest resources, recreation, and livestock grazing than either Alternative A or Alternative C. Alternative C would address resource management conflicts by increasing the level of restrictions on land uses and by providing a more intensive management of noncommodity resources than under Alternative A or B.

Alternative D, the agency's preferred alternative, generally would place greater emphasis on protection of the natural environment than Alternative A or B and would prescribe fewer restrictions on land use than Alternative C. Alternative D is made up of the management prescriptions from Alternative A for access management, fish and wildlife habitat, and forestry; a combination of management actions from Alternatives A and B for recreation and wild horses; and management actions primarily from Alternatives A and C for minerals management. The management actions for lands and realty and livestock grazing under Alternative D were drawn from Alternatives A, B, and C, but Alternative D also contains a few management actions for these programs that are not included in any of the other alternatives.

The environmental consequences that could result from the management prescriptions of the four alternatives are compared in tables 5 and 6 (chapter 2).



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ABBREVIATIONS

[Note: Many of these terms are further defined in the Glossary.]

ACEC	Area of critical environmental concern
APD	Application for Permit to Drill
APHIS	Animal and Plant Health Inspection Service, (USDA)
AMP	Allotment management plan
AUM	Animal unit month
BLM	Bureau of Land Management, U. S. Department of the Interior
BOR	Bureau of Reclamation, U. S. Department of the Interior
BP	Before present
"C" allotment	See appendix G
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations. Numbers refer to title and part; that is, 40 CFR 1500 refers to title 40, part 1500
C&MU Act	Classification and Multiple Use Act of 1964
CRMP	Cultural resources management plan
DEQ	Department of Environmental Quality, Wyoming
EA	Environmental assessment
EIS	Environmental impact statement
EPA	U. S. Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act of 1976
FS	Forest Service, U. S. Department of Agriculture
GS	Geological Survey, U. S. Department of the Interior
HMP	Habitat Management Plan
"I" allotment	See appendix G
KGS	Known geologic structure
"M" allotment	See appendix G
MBF	Thousand board feet
MCF	Thousand cubic feet
MFP	Management framework plan
mg/l	Milligrams per liter
MLRA	Major land resource area
MMBF	Millon board feet
NEPA	National Environmental Policy Act of 1969
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service, U. S. Department of the Interior
ORV	Off-road vehicle
R&PP	Recreation and public purposes
RAMP	Recreation area management plan
RMP	Resource management plan
RNA	Research natural area

RVD	Recreation visitor day
SCS	Soil Conservation Service, U. S. Department of Agriculture
SDR	Sediment delivery ratio
SRMA	Special recreation management area
TSP	Total suspended particulates
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
VRM	Visual Resource Management
WGFD	Wyoming Game and Fish Department
WSA	Wilderness study area

1 PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

This resource management plan/environmental impact statement (RMP/EIS) evaluates alternative land use plans for the management of BLM-administered public lands and resources in the Cody Resource Area. Each alternative analyzed in detail represents a complete and reasonable plan that could be used to guide the management of the area covered by this plan.

The process for the development, approval, maintenance, and amendment or revision of RMPs and their associated EISs was initiated under the authority of section 202(f) of the Federal Land Policy and Management Act of 1976 (FLPMA) and section 202(c) of the National Environmental Policy Act of 1969 (NEPA). The process is guided by Bureau of Land Management (BLM) planning regulations in 43 CFR 1600 and the Council on Environmental Quality (CEQ) regulations in 40 CFR 1500.

Development of the RMP represents the second tier of the BLM planning system, the land use planning phase. As such, it prescribes the future resource and land use management for the public lands in the planning area. It is this process of resource and land use allocations that guides activity planning, the third tier of the planning system.

The activity planning phase of the system incorporates the land and resource use decisions of the RMP into the specific management guidance for administering the resource area. During activity planning, the management prescriptions in the resource management plan will be applied to specific local areas in developing activity plans such as allotment management plans (AMPs) and habitat management plans (HMPs), in issuing use authorizations, in identifying mitigation needs, and in similar plans and implementation actions.

After it is completed, the Cody RMP will be kept current through minor maintenance or through amendments and revisions as demands on resources change, as the resources themselves change, or as new information is acquired.

PURPOSE OF AND NEED FOR THE ACTION

The major purpose in preparing the RMP is to provide a comprehensive framework for managing and allocating uses of the public lands and resources in the Cody Resource Area.

This RMP/EIS complies with present BLM rangeland policy and responds to a court mandate for preparation of a grazing EIS.

Management of BLM administered public lands and resources for the Cody Resource Area is currently guided by management framework plans (MFPs). They will be superseded by this RMP/EIS, which contains analyses of the consequences of the current and alternative management of the resource area. The purpose of the plan is to attempt to resolve the resource issues and to provide direction for site-specific activity planning and implementation of management actions in the future.

DESCRIPTION OF THE PLANNING AREA

The planning area, which contains portions of Park and Big Horn counties in north central Wyoming, lies within the administrative boundary of the Cody Resource Area of the BLM. It is bounded

on the west by the Shoshone National Forest, on the east by the Bighorn National Forest, on the north by the state of Montana, and on the south by the BLM Grass Creek and Washakie resource areas (see map 1).

The Cody RMP/EIS addresses only the BLM-administered public lands within that administrative boundary. Therefore, BLM planning decisions in the final RMP/EIS will not cover lands in Yellowstone National Park and the adjacent national forests. However, where necessary, actions inside the planning area that may affect areas outside the planning area will be considered in the analysis of the environmental consequences of the planning alternatives.

The BLM administrative responsibilities for actions concerning the federal mineral estate in national parks, national forests, and nonfederal lands are handled case by case in compliance with the land use plans developed by the other federal, state, and local agencies with surface management authority in these areas. Other BLM management responsibilities include surface management of certain lands withdrawn for the Bureau of Reclamation (BOR). The BLM manages these BOR-withdrawn lands in accordance with an interagency agreement signed in March 1983. This BLM administration applies to all BOR lands that are defined as "unimproved." Unimproved lands are lands that were set aside for reclamation purposes but generally are not needed by BOR for permanent structures or water resource development. As used in this draft RMP/EIS, "public lands" are BLM-administered federal lands including unimproved BOR lands. BOR lands that are administered by the BLM as part of the BLM grazing allotment system total about 134,700 acres.

Table 1 contains a summary of administrative authority and ownership of land surface and mineral estate in the planning area:

TABLE 1

OWNERSHIP OF LAND SURFACE AND MINERAL ESTATE IN THE PLANNING AREA

Type of Ownership or Administration	Approximate Acreage
Surface and mineral estate both administered by the BLM[1]	1,081,200
Federal mineral estate administered by BLM; surface administered by other federal agencies.	90,200
Federal mineral estate administered by BLM; surface privately owned or owned by state of Wyoming	336,800
Federal surface administered by BLM; minerals privately owned or owned by state of Wyoming	12,400
Surface and minerals privately owned or owned by state of Wyoming; BLM has no administrative authority	762,400

[1] Includes public land surface withdrawn for BOR purposes but administered by the BLM (i.e. BOR unimproved lands).

PLANNING ISSUES AND CRITERIA

Introduction

As described in detail in appendix A, the RMP process consists of nine action steps. The first step is identification of issues.

Issues Identified for Cody Planning Area

Identification

Planning issues are defined as unfilled demands, conflicts, or problems regarding the use or management of public lands and resources. Issues usually are formed from a group

of concerns expressed about the use of or effect on a resource value. Issues may be resolved by a variety of resource management options. These options are developed as alternative land use plans that are analyzed and then summarized in the RMP/EIS. The following preliminary issues were published in the *Federal Register* on February 7, 1986, under "Notice of Intent to prepare a Resource Management Plan":

> Management of vegetative resources for both consumptive and nonconsumptive uses. Examples of consumptive uses are grazing, timber harvesting, and surface disturbing activities; examples of nonconsumptive uses are watershed protection and maintenance of cover for wildlife.
>
> Special management designations to protect environmentally sensitive areas or unique resource values.

Since publication of the preliminary issues, BLM personnel have prepared the following revised issues from results of public scoping and information gathered in the analysis of the management situation.

Issue 1: Competition for Vegetation

There are conflicting demands in the planning area for consumptive and nonconsumptive uses of vegetative resources. Resources such as vegetation, watershed, water quality, and wildlife habitat need to be protected from reductions in vegetative layer and accelerated soil erosion, which may be associated with surface-disturbing activities. The basic challenge is to provide this protection and at the same time provide for utilization of vegetation through such uses as livestock grazing and wildlife foraging, timber harvest, off-road vehicle (ORV) use, oil and gas development, and mining.

Issue 2: Special Management Area Designations

In the planning area there are unique areas, resources, or values that may qualify for special management emphasis.In some areas unique resources and values are in danger of being lost; in other areas special management attention may be required to protect human life and safety from natural or created hazards. These areas may be suitable for special management consideration and for designations such as areas of critical environmental concern (ACECs), research natural areas (RNAs), special recreation management areas (SRMAs), and wildlife habitat management areas.

Issue 3: Resource Accessibility and Manageability

The value of some resources is enhanced by accessibility and the availability of the resources to be used. To be used, resources must be accessible and manageable; in other words, there must be legal and physical access so management actions or other land and resource use activities can occur. The BLM-administered lands in the planning area contain resources and resource values such as oil and gas, timber, wildlife, and recreational opportunities. The public lands should be managed to ensure the availability of these resources and values for public benefit and use. There are also resources that could be damaged or destroyed by too much access or by access at inappropriate times. Some of these are wildlife habitat and visual, cultural, and paleontological resources. Management of the public lands should protect the quality of these resources.

Planning Criteria For Cody RMP/EIS

Introduction

Planning criteria are the constraints or ground rules that guide and direct the development of the resource management plan. The planning criteria serve the following purposes:

> To ensure that the planning effort is focused on the issues and that plan preparation is accomplished efficiently
>
> To develop a planning document that details the scope and parameters of the planning effort and serves as a written link between the decision maker, the interdisciplinary team, and the public
>
> To allow the public to know what they should or should not expect from the plan.

Planning criteria are based on standards prescribed by laws and regulations, guidance provided by the BLM Wyoming State Director, the results of consultation and coordination with the public and with other agencies and governmental entities, analysis of information pertinent to the planning area, public input, and professional judgment. The planning criteria described in this chapter have been developed to help focus the preparation of alternatives and analysis of impacts and to guide selection of the preferred alternative.

General Criteria

Overall Considerations

The following factors will be considered in one or more of the alternatives of the Cody RMP/EIS:

- Management emphasis for and possible designation of areas nominated as ACECs
- Fire suppression and management options
- Intensive management of cultural and historic resources, including the Hanson prehistoric site, rock art occurrences, and historic trails
- Various levels of timber harvest
- Mineralsexplorationanddevelopment,authorizations related to lands and realty actions, ORV use, and other activities that may result in surface disturbance
- Opportunities for land disposal or acquisition that could be useful in meeting goals for resource manageability and condition
- Acquisition of access to provide reasonable levels of resource uses for the public and for resource development and manageability
- Management objectives and direction for lands on which withdrawals may be terminated in the future
- Recommendation of protective withdrawals to improve resource manageability
- Designation of right-of-way corridors, exclusion areas, and avoidance areas to provide for development needs and protect resource values
- Various levels of livestock grazing
- Management of recreational use and designation of SRMAs 5Protection of caves for the purpose of maintaining unique and nonrenewable geological, cultural, paleontological, and recreational values
- Management options for the protection or enhancement of wetlands and riparian areas
- Maintaining various numbers of wild horses
- The big game population goals of the Wyoming Game and Fish Department (WGFD)
- The protection of habitat for sensitive or important wildlife species
- The protection of recovery habitat and essential habitat for threatened or endangered wildlife species

Effects to Be Considered

The following types of effects should be addressed in the analysis of environmental consequences in the Cody RMP/EIS:

- Effects of maintaining or reducing wild horse herd size
- Effects on land and resource uses from retention or termination of existing withdrawals and other segregations
- Effects of surface-disturbing land uses and other human activities on air quality, cultural resources, cave resources, recreational opportunities, watershed, and wildlife resources
- Effects caused by livestock grazing, disposal or acquisition of land, pesticide use, and use of or restrictions on ORVs
- Economic impacts of land use restrictions on economic sectors that are heavily dependent on the use of public lands and resources (for example, minerals exploration and development, timber harvest, livestock grazing, and recreation)

Selection of Preferred Alternative

Answers to the following questions will be used to guide selection of the preferred alternative:

- Do the alternatives meet guidelines for reduction of sedimentation and salinity, as stated in water quality plans of the state of Wyoming and the Environmental Protection Agency?
- What levels of land use restrictions are needed to provide adequate protection of resource values?
- Do the alternatives retain reasonable accessibility of public lands for purposes of public access, public land use, and resource development?
- In proposing resource allocations that would affect the availability of lands for mineral development, has the BLM considered the potential of those lands for occurrence of energy and mineral resources?
- Are the alternatives consistent with plans, programs, and policies of other federal agencies, state and local governments, and Indian tribes?

Use of Standard Mitigation Guidelines

The Wyoming BLM has developed "standard mitigation guidelines" to protect important

resources in actions involving surface-disturbing activities. These guidelines are used in the RMP/EIS process both in the formulation of alternatives and in the analysis of impacts. When alternatives are formulated, it is assumed that actions proposed under each alternative will be subject to one or more of the standard mitigations. When the environmental consequences of each alternative are analyzed, the standard mitigations provide a baseline for measuring and comparing impacts among the alternatives.

The "Wyoming BLM Standard Mitigation Guidelines for Surface-Disturbing Activities" are detailed in appendix B, which also contains further information on how they are used in the RMP/EIS process. Mitigations (including restrictions on surface occupancy and/or surface activity and use) are applied as conditions of land and resource use for the following reasons: (a) to protect important cultural resources, recreational values, and wildlife resources (including threatened or endangered species); (b) to minimize soil movement on slopes; (c) to minimize disturbance of vegetation in sensitive areas such as wetland/riparian areas; or (d) to protect visual resources and historic trails.

As appropriate, surface-disturbing activities would be subject to one or more of the standard mitigations. The general types of mitigative measures to be used in the planning area and the acreage that would be affected are described in the discussion of each alternative. On lands in which the federal surface is administered by other agencies and the federal mineral estate is administered by the BLM, the standard mitigations would apply except where the surface managing agency has developed other mitigative measures or stipulations. The BLM standard mitigations would apply to private surface in situations in which (a) there could be adverse on-site or off-site effects on threatened or endangered species or on cultural resource values or (b) there could be adverse off-site effects on any resource value on BLM-administered federal surface.

Mitigation requirements developed through the use of the standard mitigation guidelines could be waived, modified, or combined with other conditions of resource use (a) to address situations beyond the analysis level of this plan (for example, development and analysis of an activity plan or a site-specific project proposal), (b) if the conditions that originally warranted a restriction (such as the presence of a sage grouse lek) no longer existed, or (c) if the proposed activity or use had been moved to another location to avoid such conditions. Conversely, mitigation requirements could be added to address situations or resource values either not present or not identified at the time the plan was developed but later identified through site-specific investigations; for example, a newly discovered raptor nest or newly identified cultural resources. Addition or modification of mitigative measures generally would be allowable as long as modified conditions of use did not prohibit the exercise of valid existing rights.

Criteria for Special Situations

Hydrocarbon Potential

As an aid in the development of alternatives, a special set of criteria was developed relative to the leasing of hydrocarbons (oil, gas, tar sand, coal, and oil shale). By inference from available geologic information, reports of past production, and information from the minerals industry, BLM personnel divided the Cody Resource Area into regions of high, moderate, and low potential for the occurrence of hydrocarbons.

Because they are so broad, the classifications developed for planning purposes are not intended to predict future activity or the locations of new discoveries. The estimates of oil and gas activity presented under each alternative in table 2 (in chapter 2) were developed from analysis of past activity and production.

Locatable Mineral Potential

A special set of criteria was developed relative to the potential for the occurrence of locatable minerals such as bentonite, gypsum, and uranium. Areas of high, moderate, and low potential were derived to facilitate analysis of the effects of management actions on locatable mineral development.

Areas with high potential for the occurrence of locatable minerals include areas with current or past mining activity and areas where mineral occurrence has been proven from exploratory activities such as stratigraphic test holes. Areas with moderate potential have geological formations known to include bentonite, gypsum, or uranium and have existing or previous mining claims. Low potential areas have no geological formations known to contain the minerals of interest. Generally, formations that are Paleozoic age or older have low potential for the occurrence of bentonite or gypsum. Uranium in the planning area is confined to the Mississippian age Madison Limestone in the Little Mountain area.

Withdrawals and Classifications

Federal Court Judge Joseph H. Pratt issued a preliminary injunction on February 10, 1986, in *National Wildlife Federation v. Robert F. Burford, et al.* (Civil Action No. 85-2238 D.C.D.C.). This order instructs the BLM to manage public lands in conformity with the express conditions contained in land withdrawal and land classification orders that were in effect on January 1, 1981. For the purposes of this document, the BLM will comply with the requirements of the injunction by assuming that under Alternative A ("no action") the segregative effects of these withdrawals and classifications (including any that had been terminated) would continue.

Under Alternatives B, C, and D, it is assumed that various existing withdrawals and classifications would be terminated and their segregative effects removed unless a specific management action listed in table 2 (chapter 2) indicates that either a new or different segregation would be needed or that an existing segregation would be retained. The impacts of management actions on these areas, including whether or not segregative effects would be involved, will be addressed in the analysis of impacts for each alternative.

It should be understood that Judge Pratt's preliminary injunction does not preclude consideration by the BLM of allocations of the affected public lands and their resources to different uses, nor does it preclude land use planning decisions that would allocate these lands to different uses. However, it does preclude implementation by the BLM of a decision that would be contrary to withdrawal and classification orders as they existed on January 1, 1981, unless or until the pending litigation is resolved. Thus, the BLM can take no action on the lands involved that would be contrary to the withdrawals and classifications until the lawsuit is settled, and then action may be taken only if that action is consistent with the court's decision.

The BLM has appealed the preliminary injunction. If the appeal is successful, actions that were taken to terminate withdrawal and classification orders between January 1, 1981, and February 10, 1986, will have been effective.

Sheep Mountain Anticline

The deputy directors of the BLM and the National Park Service (NPS) have agreed that the BLM and NPS will study possible designation as a national monument and other special management opportunities for the Sheep Mountain Anticline north of Greybull, Wyoming. This draft RMP/EIS investigates proposed ACEC designation for the Sheep Mountain Anticline area and lists alternative management actions in table 2 (chapter 2).

2 ALTERNATIVES INCLUDING PREFERRED ALTERNATIVE

INTRODUCTION

The basic goal in formulation of alternatives for a resource management plan is to identify combinations of public land uses and resource management practices that respond to the planning issues. Each alternative represents a complete and reasonable land use plan to guide future management of public lands and resources. One alternative represents "no action," which is a continuation of present management. Other alternatives provide a range of choices for solving problems associated with present management. (Problems that are present under current management have been identified through the planning process, including public involvement).

This chapter presents four resource management plan alternatives, including the BLM's preferred alternative.

Analysis of impacts that would be associated with the alternatives is required by BLM resource management planning regulations and regulations of the CEQ, which are based on NEPA. Comparison of the differences among alternatives also is required. With this analysis, BLM managers are able to choose a preferred alternative from one of the complete alternatives, from portions of the alternatives, or by modification of the alternatives.

Alternative A would continue current management practices on the basis of existing land use plans. Alternative B generally would reduce the level of land use restrictions and provide more intensive management of forest resources, recreation, and livestock grazing than either Alternative A or Alternative C. Alternative C would address resource management conflicts by increasing the level of restrictions on land uses and by providing more intensive management of noncommodity resources than would be proposed under Alternative A or B.

Alternative D, the agency's preferred alternative, generally would place greater emphasis on protection of the natural environment than Alternative A or B and would prescribe fewer restrictions on land use than Alternative C. Alternative D is made up of the management prescriptions from Alternative A for access management, fish and wildlife habitat, and forestry; a combination of management actions from Alternatives A and B for recreation and wild horses; and management actions primarily from Alternatives A and C for minerals management. The management actions for lands and realty and livestock grazing under Alternative D were drawn from Alternatives A, B and C, but Alternative D also contains a few management actions for these programs that are not included in any of the other alternatives.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The following alternatives were considered as possible methods of resolving planning questions or issues but were eliminated from detailed study because they were unreasonable or not viable because of technical, legal, or other constraints.

Elimination of Livestock Grazing

The elimination of livestock grazing from all public lands in the planning area was considered as a possible method of resolving some of the planning questions and issues related to vegetative resources. However, on the basis of work done by the interdisciplinary team and managers, the "no grazing" alternative was eliminated from detailed study for the following reasons:

Resource conditions, including range vegetation, watershed, and wildlife habitat, do not warrant a prohibition of livestock grazing throughout the planning area. However, reduction or elimination of livestock grazing may be necessary in specific situations where livestock grazing would significantly conflict with other management objectives. Such decisions, which would be determined during activity planning, would be based on the results of monitoring and studies, among other factors.

Public comments received during the scoping process and during preparation of the draft RMP/EIS indicated a general acceptance of livestock grazing on public land, provided such grazing is properly managed.

Because of the fragmented landownership pattern, especially in the western portion of the planning area, either exchanges to "block up" public lands would have been required or extensive fencing would have been needed to exclude livestock from public land. It is doubtful that enough exchanges with private landowners could have been accomplished to "block up" public lands sufficiently, and the amount of fencing needed to exclude livestock would have disrupted wildlife movement and restricted public access.

Elimination of Timber Harvesting

Possible elimination of all timber harvesting on public lands in the planning area was considered. However, the 11,260 acres of forestlands capable of sustaining forest production need to be harvested over time to maintain a healthy, vigorous forest. Because fire and, to an extent, disease have been eliminated by human influence, the harvesting of forest products helps sustain the ecological processes that maintain the healthy condition of the forest. Further, there is sufficient local demand to warrant continued forest harvest. Finally, not harvesting forest products would have been contrary to the BLM's forest management policy as established in the draft BLM Manual section 5000 under "Forest Land Policy Statement," "Public Domain Timber Management Policy," and "Woodlands Management Policy Statement."

Elimination of Mineral Leasing

One possible alternative considered was closing the planning area to mineral leasing. According to previous experience and activity expected in the future, oil and gas would have been the main resource affected, but coal and geothermal development also might have been affected. This proposal was dropped from further study because it would have been contrary to BLM Policy, which includes a provision that "except for congressional withdrawals, public lands shall remain open and available for mineral exploration unless (to do otherwise) . . . is clearly justified in the national interest." (May 24, 1987).

Elimination of leasing of oil and gas or geothermal resources was considered in the Cody Resource Area Oil and Gas Environmental Assessment (EA) (USDI, BLM 1981a). At that time the proposal was determined to be unacceptable; a review of the proposal during consideration of possible alternatives for this RMP/EIS revealed that it continues to be unacceptable. In addition, this alternative would have been directly contrary to the BLM's multiple use directives in FLPMA.

Public comments received during issue identification and comments related to the 1981 oil and gas EA indicated general acceptance of mineral development, provided it is properly managed.

ALTERNATIVES ANALYZED IN DETAIL

The four alternatives considered in the Cody RMP/EIS are described and compared in table 2. (Table 3 details information referred to in table 2.) Management actions that would be carried out in the proposed ACECs under each alternative are listed separately in table 4. In both tables 2 and 4, the restrictions that would be applied to surface-disturbing activities as conditions of land and resource uses are described first because all management actions generally would operate within the land use constraints of those restrictions.

Following the description of surface disturbance restrictions in tables 2 and 4, management actions that would be carried out under each alternative are described by resource component in table 2 and by proposed ACEC in table 4.

Environmental consequences that could be expected from implementation of each alternative are compared in tables 5 and 6 and described in detail in chapter 4.

General program guidance, policy, and regulations that influence the planned management actions are discussed in appendix C.

TABLE 2

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Cave Resources	A "no surface occupancy" restriction on leasable minerals exploration and development would be applied on about 690 acres above Natural Trap, Horsethief, and Spirit Mountain caves. These areas generally would be closed to other surface-disturbing activities such as geophysical exploration, salable minerals exploration and development, and right-of-way construction.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Any important newly discovered caves or cave passages would be protected as described above.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Cultural Resources	Surface-disturbing activities would be prohibited near significant cultural resources (such as the Hanson prehistoric occupation site), within 0.25 mile the Wiley and Sidon canals, and within 0.25 mile or the visual horizon of significant segments of historic trails, whichever is closer. Trails included are the Bridger Trail, the Nez Perce Trail, and the Fort Washakie to Red Lodge stage route. This generally would be applied to such things as leasable minerals exploration and	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	development, geophysical exploration (except casual use), and construction activities.			
Riparian Areas and Surface Water	Surface-disturbing activities would be prohibited within 500 feet of surface water and/or riparian areas except when activities are necessary and when impacts could be mitigated or avoided.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Scenic Values	Surface-disturbing activities would be prohibited in Class I and Class II visual resource management areas except when visual impacts could be mitigated or avoided.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Surface-disturbing activities would be prohibited within 0.5 mile of the North and South forks of the Shoshone River and portions of the Shoshone River and and Clarks Fork of the Yellowstone so that areas of high scenic value would be protected. This generally would apply to leasable and salable minerals exploration and development, geophysical exploration (except casual use), and construction activities.	Surface-disturbing activities would be prohibited within 500 feet of these river areas.	Same as Alternative B	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Soils	Except for timber cutting surface-disturbing activities on fragile soils would be allowed on slopes up to 25%. Timber cutting would be allowed on slopes up to 45%.	Same as Alternative A	Surface-disturbing activities would be a allowed on slopes up to 25% except on about 130,000 acres of fragile soils. On these fragile soils, surface-disturbing activities would be prohibited on slopes greater than 20%. Timber cutting would be allowed except on slopes greater than 45%.	Same as Alternative A
Special Management Areas	A "no surface occupancy" restriction would be applied on fishing and hunting access areas (about 3,460 acres), Five Springs Falls Campground (about 40 acres), and R&PP leases for the Buffalo Bill Shooting Complex and the Lovell Rod and Gun Club shooting range (about 400 acres). This generally would apply to leasable minerals exploration and development. These areas generally would be closed to other surface-disturbing activities such as geophysical exploration, salable minerals exploration and development, and construction activities except those related to development of recreation.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Bighorn River HMP/RAMP (about 2,500 acres) tracts would be open to	Same as Alternative A	Bighorn River tracts would be closed to oil and gas exploration	Same as Alternative A except that a "no surface occupancy" restriction

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	oil and gas exploration and development.		and development.	would be applied to oil and gas exploration and development.
	Surface-disturbing activities would be allowed on Bighorn River tracts.	Same as Alternative A	Bighorn River tracts generally would be closed to surface-disturbing activities such as geophysical exploration, salable minerals exploration and development, and construction activities (except those related to development of recreation or wildlife habitat).	Same as Alternative C
Wildlife Habitat	**Bald Eagles**	**Bald Eagles**	**Bald Eagles**	**Bald Eagles**
	Surface-disturbing activities would be prohibited within 2.5 miles of active bald eagle nest sites (currently involving about 2,480 acres of public land) unless effects on bald eagle essential habitat could be mitigated. This restriction would remain in effect until completion of site-specific management plans by the USFWS, after which the restriction would be reassessed. Generally, the restriction would apply to leasable and salable minerals exploration and development, geophysical exploration, and construction activities.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Big Game	**Big Game**	**Big Game**	**Big Game**
	Seasonal restrictions would be applied to surface-disturbing activities and land uses on about 325,000 acres of big game crucial habitat, including winter ranges and elk calving areas. Generally, these restrictions would apply to leasable and salable minerals exploration and development, geophysical exploration, recreation, and construction activities, including development of range projects.	Seasonal restrictions described for Alternative A would be applied on about 234,000 acres. Seasonal restrictions would not be applied on about 91,000 acres of crucial habitat inside existing KGSs or within 2 miles of KGS boundaries.	Same as Alternative A	Same as Alternative A
	Snow removal from roads in big game winter ranges would be allowed without prior approval or limitation to provide vehicle access for maintenance and operation of BLM authorized projects or activities.	Same as Alternative A	During periods of severe winter weather (average of about two years out of ten) approval of the BLM would be required before snow could be removed to gain access for maintenance and operation of BLM authorized projects or activities in big game winter ranges. The purpose would be to minimize unnecessary disturbance during periods that wildlife are under stress.	Same as Alternative C
	Black-footed Ferret Essential Habitat	**Black-footed Ferret** Essential Habitat	**Black-footed Ferret** Essential Habitat	**Black-footed Ferret** Essential Habitat
	To protect black-footed ferret habitat, surface-disturbing	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	activities would be prohibited on about 1,300 acres in the black-footed ferret essential habitat area. This generally would be applied to such things as leasable minerals exploration and development, geophysical exploration (except casual use), and construction activities.			
	Black-footed Ferret and Other Species Recovery Habitat	**Black-footed Ferret and Other Species Recovery** Habitat	**Black-footed Ferret and Other Species Recovery** Habitat	**Black-footed Ferret and Other Species Recovery** Habitat
	In high value recovery habitat areas outside the black-footed ferret essential habitat area, surface-disturbing activities would be prohibited until searches could be conducted for black-footed ferrets, swift fox, burrowing owls, and other sensitive species. If these animals were located, the lessee or permittee would be required to modify activities to protect the animal and its habitat. This restriction generally would be applied to such things as leasable minerals exploration and development, geophysical exploration (except casual use), and construction activities.	Same as Alternative A	High value recovery habitat areas for black-footed ferrets, swift fox, burrowing owls, and other sensitive species would be identified through ground surveys before BLM could apply the following restriction. (Recovery habitats would include certain types of prairie dog colonies that generally occupy less than 40 acres each.) In high value recovery habitat areas outside the black-footed ferret essential habitat area, surface-disturbing activities would be prohibited to protect recovery habitat for these animals.	Same as Alternative C

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	In moderate and low value recovery habitat areas outside the black-footed ferret essential habitat area, surface-disturbing activities would be prohibited until searches could be conducted for black-footed ferrets, swift fox, burrowing owls, and other sensitive species. If these animals were located, the lessee or permittee would be required to modify activities to protect the animal and its habitat.	Same as Alternative A	Surface-disturbing activities would be prohibited in moderate and low value recovery habitat areas.	Same as Alternative A
	Surface-disturbing activities would be prohibited on about 9,500 acres within 0.25 mile of sage grouse and sharp-tailed grouse strutting grounds (leks). Generally, this would apply to activities such as leasable and salable minerals exploration and development, geophysical exploration, and construction activities.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Seasonal restrictions would be applied to surface-disturbing activities and land use on about 262,000 acres in grouse habitat areas within a 2-mile radius of lek centers. Generally these restrictions would apply to leasable and salable	Seasonal restrictions as described in Alternative A would be applied on about 137,000 acres. Seasonal restrictions would not be applied on about 125,000 acres of habitat inside existing KGSs or within 2 miles of KGS boundaries.	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	minerals exploration and development, geophysical exploration, recreation, and construction activities, including development of range projects.			
	No additional management actions would be planned.	Same as Alternative A	If proposed surface disturbances could not be mitigated by improvement of present grouse habitat or development of other habitat suitable for grouse, surface-disturbing activities would not be allowed in a given sage or sharp-tailed grouse habitat area (that is, within 2 miles of the center of a lek) if total unreclaimed surface disturbance would exceed 10% of that habitat area.	The BLM would follow an objective of keeping unreclaimed surface disturbances on any given grouse habitat area to less than 10% of the total surface in that habitat area. Emphasis would be placed on improvement of present grouse habitat or development of other habitat suitable for grouse and on the use of reclamation plans in these areas.
	Peregrine Falcons	**Peregrine Falcons**	**Peregrine Falcons**	**Peregrine Falcons**
	A "no surface occupancy" restriction would be applied on new mineral leases in peregrine falcon recovery habitat areas (about 9,000 acres in six locations). This restriction would continue for a period of ten years, or until peregrine falcons became reestablished (whichever occurred first), after which the restriction would be reassessed.	Peregrine falcon recovery habitat would not be protected by a restriction on surface occupancy.	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	In peregrine falcon recovery habitat areas, seasonal limitations would be placed on timber management actions (not including use of access), some recreation activities, oil and gas exploration and development on existing leases, geophysical exploration, and construction activities. Surface uses would not be permitted from April 1 through July 31. These restrictions would continue for ten years or until peregrine falcons became reestablished (whichever occurred first), after which the restriction would be reassessed.	Peregrine falcon recovery habitat would not be protected by seasonal limitations on activities.	Same as Alternative A	Same as Alternative A
	In peregrine falcon recovery habitat areas, the improvement and upgrading of existing roads and trails and the construction of new roads and aboveground power lines would be avoided, although road maintenance would be allowed.	No restrictions like those described for Alternative A would be placed on roads, trails, or aboveground power lines in peregrine falcon recovery habitat.	Same as Alternative A	Same as Alternative A
	Raptors During the nesting period, a seasonal restriction would prohibit surface-disturbing activities within 0.75 mile of raptor nests or the visual horizon of the nest,	**Raptors** Same as Alternative A	**Raptors** Same as Alternative A	**Raptors** Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Resources Protected by Restrictions on Surface-Disturbing Activities[1]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	whichever is closer (about 40,260 acres). This generally would apply to such things as leasable and salable minerals exploration and development, geophysical exploration, and construction activities, including development of range projects and treatments.			
	Road construction and improvement would be allowed within 0.75 mile of raptor nests except during the nesting period.	Same as Alternative A	Road construction and improvement would be avoided whenever possible, within 0.75 mile of raptor nest sites or the visual horizon of the nest, whichever is closer. The purpose would be to limit increased vehicle use and related disturbances that could occur during the nesting period because of improved vehicle access.	Same as Alternative C
	Surface-disturbing activities would be prohibited if they would result in the loss of a specific active raptor nest or a structure on which a nest is built, or if they would cause loss of significant portions of concentration, foraging, or nesting habitat for raptors.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Air Quality	Objective: To maintain air quality at state Class II standards, or better.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
Cultural Resource Management[3]	Objective: To expand the protection, study, and interpretation of cultural and paleontological resources.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
Emergency site	Same as Alternative A stabilization and long-term protection projects would be completed on five known sites (about 60 acres), including the Hanson prehistoric occupation site and several rock art sites.	Same as Alternative A	Same as Alternative A	
	Cultural resource activity plans would not be prepared.	Same as Alternative A	Cultural resource activity plans would be prepared for the Hanson prehistoric occupation site, several rock art occurrences, historic trails, including the Bridger Trail, the Nez Perce Trail, the Fort Washakie to Red Lodge stage route, and other important sites such as the Wiley and Sidon canals.	Same as Alternative C
Fire Management	Objectives:	Objectives:	Objectives:	Objectives:
	To use prescribed fire to meet resource management objectives (such as improvement of wildlife habitat and range condition).	Same as Alternative A	Same as Alternative A	Same as Alternative A
	To suppress wildfires for the protection of resource values, property, and human life.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Prescribed fire would be used to accomplish management objectives described in resource activity plans, including HMPs, AMPs, and the Rattlesnake Mountain Forest Management Plan.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Full suppression of all wildfires would be practiced throughout the planning area.	Full suppression of wildfires would be practiced in portions of the planning area west of Wyoming Highway 120 and in an area east of the Bighorn River. (This totals about 240,000 acres.) The remaining 841,000 acres of the planning area would be designated a limited suppression area (map 2 shows fire suppression areas).	Same as Alternative B	Same as Alternative B
	Some methods of wildfire suppression would be restricted in sensitive areas. For example, the use of heavy equipment would be restricted in areas of fragile soils, in wetland/riparian areas, on lands above significant caves, on Sheep Mountain west of Cody, on Carter Mountain, and in timbered areas on the east end of Rattlesnake Mountain.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Forestland Management	Objective: To meet timber harvest objectives and improve forest and wildlife habitat values.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Approximately 1,500 cords of fuelwood per year (750 MBF/year) would be harvested.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	About 300 acres would be planted and seeded with conifer species to regenerate areas denuded by wildfire and harvesting. Other harvested areas would be planted with conifer species if these areas have not regenerated naturally within 15 years of the harvest.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The BLM would allow precommercial thinning in overstocked areas and regenerated timber sale areas when trees in those areas reached the 20- to 30-year age class. An average of 30 acres per year would be thinned.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The Rattlesnake Mountain Forest Management Plan would be revised for better integration of forest and wildlife management practices.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	About 0.5 miles of roads would be built annually to meet planned harvest needs. Possible road closures would be assessed individually. Generally, spur roads would be closed after completion of timber harvests.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Forestlands on Rattlesnake Mountain would be classified as a restricted management area where wildlife, watershed, and recreation resource values would be emphasized. Partial cutting, extended forest crop rotations, or other restrictions on forest management would be applied.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The BLM would seek to acquire access along Trail Creek to Rattlesnake Mountain for administrative purposes only.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	A maximum of 500 MBF of sawtimber would be harvested from about 70 acres annually. Silvicultural treatments would be designed to favor spruce and fir regeneration. Lodgepole pine would be clearcut from about 145 acres, and mixed conifers would be harvested from about 215 acres with the use of two-stage shelterwood and selective cutting techniques.	A maximum of 800 MBF of sawtimber would be harvested from about 100 to 150 acres annually. Silvicultural treatments would favor regeneration of existing species (for example, conifer species present immediately before harvesting). Lodgepole pine would be clearcut from about 900 acres, and mixed conifers would be harvested from about 2,000 acres with the use of two-stage shelterwood techniques.	Same as Alternative A	Same as Alternative A
	All forestlands outside the Rattlesnake Mountain area would be managed to enhance or maintain other resources or resource uses such as recreation opportunities, livestock grazing,	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	wildlife, watershed, and scenic values. Some of these forestlands are on the west slope of the Bighorn Mountains, on Carter Mountain, and on Little Mountain.			
Geothermal Resources	Objective: To maintain opportunities for geothermal exploration and development.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	Geothermal resources would be available for leasing in areas open to oil and gas leasing. All other areas would be closed to geothermal leasing.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	In areas open to geothermal leasing, exploration for and development of geothermal resources would be allowed subject to restrictions on surface-disturbing activities in the same manner that these restrictions are applied to oil and gas activities (see appendix B and "Restrictions" section of this table).	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Anticipated Levels of Activity: No geothermal leasing or development interest has been identified in the planning area. It is anticipated that development will not occur within the next ten years.	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Objective: To protect public land resources and uses from hazardous waste contamination.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	Hazardous Wastes	**Hazardous Wastes**	**Hazardous Wastes**	**Hazardous Wastes**
	Sites contaminated with hazardous wastes would be reported, and responsible parties would be required to clean them up and compensate for damages according to federal and state regulations and BLM-approved plans.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Hazardous Materials	**Hazardous Materials**	**Hazardous Materials**	**Hazardous Materials**
	For activities on public lands that use hazardous materials, the BLM would monitor precautionary measures to guard against leakage into the environment.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Other Hazards	**Other Hazards**	**Other Hazards**	**Other Hazards**
	If any hazards should be identified, the BLM would provide warnings and establish precautions regarding safety hazards associated with the use of any areas on public land.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Objectives: To manage the public lands to support the goals and objectives of other resource programs, to	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	respond to public demand for land use authorizations, and to acquire administrative and public access where necessary.			
	Access	**Access**	**Access**	**Access**
	The BLM would seek to acquire access along Trail Creek to Rattlesnake Mountain for administrative purposes only.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Acquisition of public access to the Little Mountain and Cedar Mountain areas would have priority.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Public access opportunities in the Carter Mountain area would be maintained.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The BLM would maintain recreational access to public lands along the North and South forks of the Shoshone River, to tracts covered by the Bighorn River HMP/RAMP, and to public land along the Clarks Fork of the Yellowstone River.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Landownership Adjustments	**Landownership Adjustments**	**Landownership Adjustments**	**Landownership Adjustments**
	All BLM-administered public lands in the planning area that are not withdrawn or classified for special purposes would be considered for disposal under section 203	About 55,900 acres would be considered for disposal under section 203 of FLPMA, subject to site-specific disposal criteria (appendix E). Priority would be given to	Same as Alternative B	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	of FLPMA, subject to site-specific analysis.	disposal of lands to meet community needs. (See section on "Withdrawals and Classifications" for other lands that may have potential for future disposal.)		
	All BLM-administered public lands in the planning area, including lands considered for disposal under section 203 of FLPMA, would be considered for disposal by other means, including desert land patent, exchange, and R&PP patent. The preferred method of disposal would be through exchange.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Through land exchanges, the BLM would try to acquire nonfederal lands in sections 28, 29, 32, and 33, T. 56 N., R. 94 W.; sections 4 and 5, T. 55 N., R. 94 W., and in other areas that contain recovery habitat for threatened or endangered species.	Same as Alternative A	Same as Alternative A	Same as Alternative A
The Franklin Floyd exchange	Same as Alternative A would be pursued to obtain about 180 acres that would complement wildlife habitat management in the Bighorn River HMP/RAMP area.	Same as Alternative A	Same as Alternative A	
	Private lands would be considered for acquisition individually. (Appendix E contains information on	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	lands for potential acquisition.)			
	Anticipated Levels of Activity: An average of about 2,000 acres per year, over a period of 10 to 20 years, would be disposed of through desert land patents, mineral patents, and R&PP patents and public sale. About 500 acres per year would be disposed of through exchanges, and an equal acreage would be acquired through these exchanges.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Utility/Transportation Systems	**Utility/Transportation** Systems	**Utility/Transportation** Systems	**Utility/Transportation** Systems
	When rights-of-way would be required in avoidance areas or when the area could not reasonably be avoided, the effects of right-of-way construction would be intensively mitigated.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Existing right-of-way concentration areas (map 3) generally would be preferred locations for future right-of-way grants. Corridors would not be designated.	Areas that would be designated as utility and pipeline corridors and communication site windows are shown on map 4. These would include existing right-of-way concentration areas, two proposed (unoccupied) corridors, and three communication sites. Designated corridors and windows would be the preferred locations for placement of future utility	Areas that would be designated as communication site windows are shown on map 5. These would include three communication sites. (Utility and pipeline corridors would not be designated in this alternative.) Designated windows would be the preferred locations for placement of future communication site rights-of-way.	Areas that would be designated as utility and pipeline corridors and communication site windows are shown on map 6. These areas would include existing right-of-way concentration areas and three communication sites. Designated corridors and windows would be the preferred locations for placement

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
		rights-of-way and communication sites. Transportation corridors would not be designated.	Transportation corridors would not be designated.	of future communication sites and utility pipeline rights-of-way. Transportation corridors would not be designated.
	To protect scenic quality, placement of aboveground facilities such as power lines would be avoided along major transportation routes if the rights-of-way would be substantially noticeable by the traveling public.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Lands adjacent to major rivers would not be designated avoidance areas for placement of power lines (see map 7).	Same as Alternative A (see map 8)	A right-of-way avoidance area for construction of aboveground power lines would be designated within 2 miles of the Bighorn River and within 1 mile of the Shoshone and Greybull rivers and the Clarks Fork of the Yellowstone. The avoidance area would be designated to reduce mortality of raptors, waterfowl, and other water birds from electrocution and collisions (see map 9).	Same as Alternative C
	The Bighorn River HMP/RAMP area would not be designated an avoidance area for placement of rights-of-way.	Same as Alternative A	The Bighorn River HMP/RAMP area would be designated a right-of-way avoidance area to protect wildlife, scenic, and recreational values.	Same as Alternative C
	The black-footed ferret essential habitat area would be designated a right-of-way avoidance area for roads and aboveground	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	power lines. The purpose of this would be to minimize surface disturbances in the essential habitat area and to reduce the number of raptor perch sites from which raptors could prey upon ferrets.			
	Bald eagle and other raptor nesting habitat would not be designated right-of-way avoidance areas.	Same as Alternative A	Lands within 2.5 miles of active bald eagle nests and within 0.75 mile of other raptor nests would be designated right-of-way avoidance areas for road construction.	Same as Alternative C
	Significant segments of historic trails would not be designated right-of-way avoidance areas.	Same as Alternative A	Significant segments of historic trails would be avoided for the placement of all types of rights-of-way. Where feasible, rights-of-way would be placed across trail routes in existing right-of-way crossing areas.	Same as Alternative C
	Anticipated Levels of Activity: It is anticipated that during the next ten years about 650-700 acres will be disturbed by pipeline rights-of-way, 550-600 acres by power line construction, 3,000 acres disturbed by road rights-of-way, and 250-300 acres by other types of right-of-way construction.	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Withdrawals and Classifications	**Withdrawals and** Classifications	**Withdrawals and** Classifications	**Withdrawals and** Classifications
	About 229,300 acres of lands withdrawn for the BOR and other federal agencies (not including BLM) would remain closed to operation of the general mining laws and the public land laws. Closures to operation of the general mining laws would prohibit the staking of mining claims for locatable minerals exploration and development. Closures to operation of the public land laws would generally prohibit landownership adjustments through disposals, including public sale, exchange, desert land patent, and R&PP patent.	About 154,000 acres of of BOR withdrawn lands would be opened to operation of the general mining laws and the public land laws. On about 75,300 acres of lands withdrawn for the BOR and other federal agencies (not including BLM), closures to the mining and public land laws would remain in effect.	Same as Alternative B	Same as Alternative B
	About 493,000 acres of C&MU classified lands that are closed to operation of the public land laws would remain closed. In addition, about 7,000 acres of C&MU classified lands would remain closed to operation of both the general mining laws and the public land laws (see appendix F).	About 493,000 acres of C&MU classified lands would be opened to operation of the public land laws. About 6,840 acres would be opened to operation of both the general mining laws and the public land laws. For the protection of recreation values in the Five Springs Falls area, about 160 acres would remain closed to operation of the general mining laws.	Same as Alternative B	Same as Alternative B
	At Newton Lakes and the Heart Mountain Relocation	The Newton Lakes area (about 480 acres) and the	Same as Alternative B	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Site, restrictions on surface-disturbing activities would be applied on the basis of site-specific analyses.	Heart Mountain Relocation Site (about 320 acres) would be protected by a "no surface occupancy" restriction on oil and gas exploration and development. Other surface-disturbing activities generally would be prohibited. These activities would include such things as salable minerals exploration and development and right-of-way construction (except rights-of-way related to development of recreational or interpretive facilities).		
	The Heart Mountain Relocation Site would not be developed for interpretive use.	Interpretive facilities would be developed at the Heart Mountain Relocation Site to enhance cultural and historic values.	Same as Alternative B	Same as Alternative B
	The Newton Lakes area and the Heart Mountain Relocation Site would continue to be closed to locatable mineral development.	The Newton Lakes area and the Heart Mountain Relocation Site would be open to locatable mineral development.	Same as Alternative A	Same as Alternative A
	Bureau of Reclamation withdrawn lands could not be disposed of under section 203 of FLPMA.	About 7,200 acres of BOR-withdrawn lands would be considered for disposal under section 203 of FLPMA after these lands were restored to operation of the public land laws (see appendix E).	Same as Alternative B	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Livestock Grazing Management	Objective: To provide for existing levels of livestock use.	Objective: To maximize forage production and livestock use.	Objective: To improve forage production and ecological condition so that benefits to wildlife and watershed resources would be enhanced.	Objective: To improve forage production and ecological condition for the benefit of livestock use, wildlife, and watershed resources.
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	The short-term livestock grazing use would continue to be about 77,896 AUMs of forage use annually, although short-term grazing use could occur up to the level of active preference, or 90,895 AUMs annually.	Short-term livestock grazing use would be about 90,895 AUMs of forage use annually.	Short-term livestock grazing use would be about 61,371 AUMs of forage use annually.	Short-term livestock grazing use would vary from about 71,741 to 90,895 AUMs of forage use annually.
	A short-term reduction from the grazing level of active preference would not be made in this alternative. Grazing use could continue up to the level of active preference, or 90,895 AUMs annually.	Same as Alternative A	Short-term reductions in livestock grazing would be made on 60 allotments, and livestock use would be eliminated on 2 allotments (765 acres) to reduce conflicts with wildlife. To protect about 8,300 acres of wetland/riparian areas, other livestock use would be managed by the development of off-site water sources or by the elimination of grazing.	Short-term reductions in livestock use would be made on 47 allotments to reduce conflicts with wildlife. To protect about 1,800 acres of wetland/riparian areas, other livestock use would be managed by the development of off-site water sources or by the elimination of grazing.
	Long-term livestock grazing use would be about 76,867 AUMs annually (see "Proposed Stocking Levels" in appendix G).	Long-term livestock grazing use would be 93,577 AUMs annually (see "Proposed Stocking Levels" in appendix G).	Long-term livestock grazing use would be about 80,510 AUMs annually (see "Proposed Stocking Levels" in appendix G).	Long-term livestock grazing use would vary from about 73,070 to 75,354 AUMs annually (see "Proposed Stocking Levels" in appendix G).
	Livestock grazing use would be adjusted as a result of	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	monitoring and/or negotiation with grazing permittees.			
	Spring grazing would remain the same on 21 "I" category allotments.	Spring grazing would be modified on 10 to 15 "I" category allotments through the use of rest-rotation grazing systems. Spring grazing would continue on the other "I" category allotments without modification.	Spring grazing would be eliminated on 21 "I" category allotments.	Spring grazing would be modified on about seven "I" category allotments through the use of spring deferment grazing. Spring grazing on the other "I" category allotments would be modified, as appropriate, on the basis of results of monitoring.
	Grazing season of use would remain the same on "M" and "C" category allotments.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Prairie dogs would be controlled on about 225 acres in two allotments, and in other areas as necessary.	Same as Alternative A	Control of prairie dogs would be prohibited to improve wildlife prey bases.	Same as Alternative A
	Livestock grazing would be allowed on Bighorn River HMP/RAMP tracts (about 2,500 acres).	Same as Alternative A	Livestock grazing would not be allowed in Bighorn River HMP/RAMP tracts.	Same as Alternative C
	High intensity monitoring would be conducted on 4 allotments covered by AMPs and on allotments in the McCullough Peaks wild horse herd management area. Low intensity monitoring would be conducted on all other allotments.	High intensity monitoring would be conducted on allotments identified as top "I" priority and on AMP areas and allotments of the McCullough Peaks wild horse herd management area. Low intensity monitoring would be conducted on other "I" allotments and on "M" and "C" category allotments.	Same as Alternative B	Same as Alternative B
	Four existing AMPs covering about 126,700 acres would be modified to improve	AMPs would be developed for all allotments in the planning area. The	AMPs would be developed for all "I" category allotments with wildlife/livestock	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	existing livestock grazing management. No additional AMPs would be developed.	intensity of the management plans would depend on allotment condition and resource conflicts.	conflicts, with the objective of enhancing wildlife resources. AMPs would not be developed for other "I" allotments or for "M" or "C" allotments.	
	Range projects and land treatments would be developed primarily in allotments covered by existing AMPs so that AMP objectives could be met.	Range projects, land treatments, and grazing systems would be developed primarily to increase forage availability for livestock grazing use (see appendix G).	Range projects, land treatments, and grazing systems would be developed to enhance wildlife, watershed, and wetland/riparian area values (see appendix G).	Range projects, land treatments, and grazing systems would be developed to increase forage availability for livestock use and to enhance wildlife, watershed, and wetland/riparian area values (see appendix G).
	Structural projects (fences, pipelines, water developments) would be constructed in about four allotments.	Structural projects would be constructed in about 29 allotments to improve overall grazing distribution and promote grazing management systems.	Structural projects consisting primarily of fencing and water developments would be constructed in about 27 allotments.	Structural projects would be constructed in about 30 allotments.
	Land treatments such as prescribed burning, ripping and seeding, and contour furrowing would be carried out on about four allotments.	Land treatments would be carried out on about 46 allotments.	Land treatments would be carried out on about 28 allotments.	Land treatments would be carried out on about 29 allotments.
	Grazing systems would not be implemented (see appendix G).	Grazing systems would be implemented in about 10 allotments.	Same as Alternative B	Grazing systems would be implemented in about 14 allotments.
	Livestock trailing would continue to be authorized on lands inside and outside of withdrawn stock driveways.	Portions of allotments that are outside withdrawn stock driveways and are affected by trailing would be monitored to determine whether the allotment could accommodate trailing without unacceptable effects on resources. The	Livestock trailing would be allowed only in existing designated stock driveways. Withdrawals for driveways that are being used for livestock trailing would be retained. Other stock driveway withdrawals would be terminated if the	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
		BLM would reserve the right to modify routes of historic trailing use, to mitigate any impacts associated with trailing, or to deny trailing use if the impacts could not be adequately mitigated. Although the BLM would modify trailing use as appropriate, stock driveway withdrawals generally would be retained.	lands were not being used for trailing purposes.	
Minerals Management	Objective: To maintain or enhance opportunities for mineral exploration and development.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Leasable Minerals—Coal	**Leasable Minerals—Coal**	**Leasable Minerals—Coal**	**Leasable Minerals—Coal**
	The coal screening process has not been conducted. Interest in exploration or leasing would be handled case by case. If an application for a coal lease is received sometime in the future, an appropriate land use and environmental analysis, including the coal screening process, would be conducted to determine whether or not the coal areas applied for are acceptable for development and for leasing consideration. The RMP would be amended as necessary.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Anticipated Levels of Activity: To date, no interest has been expressed in coal leasing and development in the planning area. It is anticipated that there would be no coal development in the planning area in the next ten years.	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A
	Leasable Minerals —Geophysical Exploration	**Leasable Minerals** —Geophysical Exploration	**Leasable Minerals** —Geophysical Exploration	**Leasable Minerals** —Geophysical Exploration
	The planning area would be open to geophysical exploration except for lands identified as closed to oil and gas exploration and development or with "no surface occupancy" restrictions for oil and gas. Geophysical exploration on open lands would be subject to ORV limitations and restrictions on surface-disturbing activities (see "Restrictions" section of this table and appendix B).	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Anticipated Levels of Activity: It is expected that geophysical exploration would cause about 300 acres of surface disturbance per year.	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A
	Leasable Minerals —Oil and Gas	**Leasable Minerals —Oil** and Gas	**Leasable Minerals —Oil** and Gas	**Leasable Minerals —Oil** and Gas
	Oil and gas reclamation plans to address entire fields or specific	Same as Alternative A	Oil and gas reclamation plans would be prepared to improve reclamation in old	Same as Alternative C

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	sensitive areas would not be prepared.		fields throughout the planning area, to allow for orderly development of new fields, and to provide for reclamation in sensitive areas such as habitat areas for sharp-tailed grouse and sage grouse and habitat for big game.	
	Table 3, which follows this summary, shows the percentage of federal mineral estate in the planning area with high, moderate, and low potential for hydrocarbon occurrence on which oil and gas activities would be restricted.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	It is estimated that 45-50 wildcat wells and 620-630 development wells would be drilled in the planning area during the next ten years.	It is estimated that 50-55 wildcat wells and 620-630 development wells would be drilled in the planning area during the next ten years.	It is estimated that 40-45 wildcat wells and 620-630 development wells would be drilled in the planning area during the next ten years.	Same as Alternative A
	Development wells would be drilled in or near existing KGSs. Wildcat wells would lead to the discovery of an estimated total of six new fields, each of which probably would produce less than 1 million barrels of oil or 6 million cubic feet of natural gas during its lifetime. Approximately 30-35 development wells would be drilled in these six new fields.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Locatable Minerals	**Locatable Minerals**	**Locatable Minerals**	**Locatable Minerals**
	Bighorn River HMP/RAMP tracts (about 2,500 acres) would not be closed to locatable mineral entry.	Same as Alternative A	Bighorn River HMP/RAMP tracts would be closed to locatable mineral entry to protect recreational values and wildlife habitat.	Same as Alternative C
	Plans of operations or notices of intent would be required for locatable mineral exploration and development (except casual use) consistent with regulations. (A plan of operations would be required for disturbances of more than 5 acres.)	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Anticipated Levels of Activity:	Anticipated Levels of Activity:	Anticipated Levels of Activity:	Anticipated Levels of Activity:
	About 400 acres of disturbance per year would be caused by bentonite mining, which would be primarily on the west flank of the Bighorn Mountains and the southern flank of the Pryor Mountains north of Cowley and Lovell.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	About 5 acres per year would continue to be disturbed by gypsum mining, and less than 5 acres per year would be disturbed by uranium exploration and development.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Salable Minerals	**Salable Minerals**	**Salable Minerals**	**Salable Minerals**
	Sales of mineral materials from existing sites would	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	be allowed. Proposed sales from new sites would be evaluated individually.			
	Anticipated Levels of Activity: About 40 acres per year would be disturbed by mining for salable minerals.	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A	Anticipated Levels of Activity: Same as Alternative A
Off-Road Vehicle Management	Objective: To maintain or enhance opportunities for ORV use and mitigate effects on resource values.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	The entire planning area would be open to ORV use.	ORV use in the planning area would be limited to existing roads and trails except as described below and shown on map 11.	ORV use in the planning area would be limited to existing roads and trails except as described below and shown on map 12. (Acreages listed in this section are not additive because of overlap.)	ORV use in the planning area would be limited to existing roads and trails except as described below and shown on map 13. (Acreages listed in this section are not additive because of overlap.)
	ORV play areas would not be established.	ORV play areas would be established in suitable areas such as the bentonite hills near Lovell, Irma Flats/Diamond Basin near Cody, the Lovell Lakes motocross area, and areas near Powell and Greybull. These areas would be designated either open to all uses or limited to specific types of ORV use, depending on management needs.	Same as Alternative B	Same as Alternative B
	Bullet impact zones would not be closed to ORV use.	Bullet impact zones comprising about 2,000 acres around the Buffalo	Same as Alternative B	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
		Bill Shooting Complex and the Lovell Rod and Gun Club shooting range would be closed to ORV use (see map 11).		
	Fragile soils would not be protected by limitations on ORV use.	Same as Alternative A	Fragile soils susceptible to compaction or severe erosion (about 130,000 acres) would be closed to ORV use. In wet periods of spring, autumn, and winter, about 822,000 acres of fragile soils would be protected by seasonal ORV closures or by limitations on types of vehicles.	Fragile soils would be protected on about 95,800 acres by limitations on ORV use to designated roads and trails.
	Lands having characteristics suitable for nonmotorized recreation would not be closed to ORV use.	Same as Alternative A	On about 51,000 acres identified as having characteristics suitable for semiprimitive nonmotorized recreation, lands would be closed to ORV use.	Same as Alternative A
	VRM Class I and Class II areas would not be protected by limitations on ORV use.	Same as Alternative A	ORV use would be limited to designated roads and trails on about 543,000 acres with Class I and Class II VRM ratings (highly scenic areas).	ORV use would be limited to designated roads and trails on about 95,800 acres with Class I and Class II VRM ratings.
	Habitat for threatened or endangered species would not be protected by limitations on ORV use.	Same as Alternative A	On about 12,780 acres of threatened or endangered species habitat, ORV use would be limited to designated roads and trails, or seasonal restrictions would be applied.	Same as Alternative C
	Cultural resources would not be protected by limitations on ORV use.	Same as Alternative A	ORV use would be limited to designated roads and trails on about 1,000	Same as Alternative C

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
			acres to protect significant cultural resources.	
	Lands over cave passages would not be protected by limitations on ORV use.	Same as Alternative A	ORV use would be limited to designated roads and trails on about 2,000 acres over cave passages.	Same as Alternative C
	The Bighorn River SRMA (about 42,000 acres, including the Bighorn River HMP/RAMP and adjacent lands) and the West Slope SRMA (about 165,300 acres) would not be protected by limitations on ORV use.	Same as Alternative A	ORV use would be limited to designated roads and trails in the Bighorn River and West Slope SRMAs.	Same as Alternative C
	Forest and wildlife habitats on Rattlesnake Mountain would not be protected by limitations on ORV use.	Same as Alternative A	To enhance management of forest and wildlife habitat, ORV use would be limited to designated roads and trails on about 19,000 acres on Rattlesnake Mountain.	Same as Alternative C
	Objective: To maintain existing opportunities for outdoor recreation.	Objective: To maintain opportunities for outdoor recreation and promote more use of recreational areas.	Objective: To maintain opportunities for outdoor recreation and promote more primitive or undeveloped recreation.	Objective: To enhance opportunities for primitive recreation while increasing visitor services in some areas to meet needs for more developed forms of recreation.
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	Cave management in the Worland Caves SRMA would continue under the Worland Cave Management Plan. Caves with significant resource values would be added to the Worland Caves SRMA (see map 14).	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Recreational use of the Bighorn River for fishing, hunting, and float boating would be managed under the Bighorn River HMP/RAMP (see and map 14).	Same as Alternative A	Same as Alternative A	Same as Alternative A
	SRMAs would not be designated for the West Slope or Bighorn River areas or for historic trails.	Same as Alternative A	Three SRMAs would be designated. The West Slope SRMA (covering the west slope of the Bighorn Mountains) and the Bighorn River SRMA would total about 207,000 acres. Another SRMA would comprise significant segments of historic trails (see map 15). Activity plans would be developed for all SRMAs.	Same as Alternative C
	All portions of the planning area not designated SRMAs would be designated an extensive recreation management area (ERMA), and an activity plan would be developed for the ERMA.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	No new recreation sites would be developed.	The BLM would develop recreation sites at Rainbow Canyon, at Hogan Reservoir, and on designated Bighorn River tracts.	Same as Alternative B	Same as Alternative B
	Interpretive sites and directional or interpretive signs would not be developed.	An interpretive site would be developed for McCullough Peaks. Additional directional and interpretive signs would be installed to facilitate recreational use of the west slope of the Bighorn	Same as Alternative A	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
		Mountains; Cedar Mountain; the Nez Perce and Bridger historic trails; the Fort Washakie to Red Lodge stage route; the Shoshone, Greybull, and Bighorn rivers; and the Clarks Fork of the Yellowstone River (see map 15).		
Visual Resource Management	Objective: To maintain or improve scenic values and visual quality.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	Visual resource values would be considered before land uses would be authorized. Visual resources would be managed in accordance with objectives for VRM classes that have been assigned to the planning area. These VRM classes are shown on map 16. Adverse effects on visual resources would be mitigated through the use of standard mitigation guidelines (appendix B). The BLM's system of visual resource management is described in appendix H.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Watershed Management	Objective: To stabilize soils, increase vegetative production, and maintain or improve water quality.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	About 700 acres of spreader dikes and 10 detention dams would be maintained. Other	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	watershed projects would be maintained as necessary.			
	Water quality would be monitored in areas where noxious weeds were treated. Priority for monitoring would be assigned to municipal watersheds, fish hatchery supply watersheds, and domestic or agricultural use watersheds with major fish-bearing streams.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	To reduce sediment loadings in streams and river segments, the BLM would implement "best management practices" recommended in the state of Wyoming's Bighorn Basin plans (see appendix I). These BMPs would be contained in various BLM activity plans and in BLM use authorizations, as appropriate. Priority stream segments for use of BMPs and development of watershed activity plans would be the following:	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Priority 1. Shoshone River from its confluence with the Bighorn River to Buffalo Bill Dam. Within the Shoshone subbasin, priority drainages would be Whistle, Deer, Coon, and Sand creeks, Roan Wash, and Foster Gulch.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Priority 2. Bighorn River from Bighorn Reservoir to Greybull. Within the Bighorn subbasin, priority drainages would be Crystal, Bear, and Dry Bear creeks (see map 17).	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The BLM might acquire oil and gas exploratory wells and geophysical drill holes that produce water. These wells would be developed for multiple use if they met the criteria listed in appendix I for water well conversion.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	To obtain valid water rights, the BLM would file all water-related projects with the Wyoming State Engineer's Office.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	If karst areas were discovered that exhibit underground drainage characteristics similar to those in the Spanish Point Karst ACEC (in the Washakie Resource Area), they would be proposed for ACEC designation.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Wilderness Study Areas	Recommendations for designation or nondesignation of WSAs as wilderness would be submitted to Congress through the Director of the BLM, the Secretary of the Interior, and the	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	President. (Management prescriptions for the 24,570-acre McCullough Peaks WSA and recommendations regarding wilderness designation or nondesignation are covered in the Grass Creek/Cody Wilderness EIS; therefore, they have not been repeated in this document.) Until Congress acts, the McCullough Peaks WSA would be managed under the BLM's interim management policy. Whatever decision Congress makes on this WSA will become part of the final Cody RMP, and if necessary the RMP will be amended.			
Wild Horse Management	Objective: To maintain a viable herd of wild horses so that the free-roaming nature of the herd would be maintained and opportunities would be available for the public to view wild horses.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	The McCullough Peaks wild horse herd area would be managed so that an overall population of 100 horses would be maintained.	The McCullough Peaks wild horse herd would be maintained at about 75 horses.	The McCullough Peaks wild horse herd would be maintained at about 135 horses. In addition, about 45 horses would be maintained in an adjacent area known as the Foster Gulch herd area (see map 18).	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Approximately 5 miles of fence would be built adjacent to private land on the northern boundary of the McCullough Peaks herd area to contain wild horses in the herd area.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Wildlife and Fish Habitat	Objective: To maintain and enhance fish and wildlife resources so that the forage production and quality of rangelands and fish and wildlife habitat will be maintained or improved.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Management Actions:	Management Actions:	Management Actions:	Management Actions:
	The condition of uncommon and important wildlife habitats would be maintained or improved through vegetative manipulations, standard mitigative measures, or other management actions. Uncommon and important wildlife habitats include wetlands; mountain shrublands; and Douglas-fir, Engelmann spruce-subalpine fir, and aspen-conifer forestlands.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The Peregrine Falcon Recovery, West Slope, and Bighorn River HMPs would be revised as necessary and implemented.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Pending the development of a site-specific management	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	plan by the USFWS, public lands within 2.5 miles of one active bald eagle nest in the planning area would be managed as essential habitat for bald eagle production and recovery.			
	The following areas would be incorporated into the Yellowtail Habitat Management Unit for bald eagle recovery: Tract 84 north of the Shoshone River, T. 56 N., R. 95 W., sec. 4, lots 3 and 4; sec. 5, lot 3; and sec. 6, lot 8. These areas would be managed consistently with other lands in the habitat management unit.	Same as Alternative A	Same as Alternative A	Same as Alternative B
	Except for the purpose of improving wildlife habitat or vegetative condition, sagebrush control measures would not be allowed in sage grouse or sharp-tailed grouse strutting grounds, on big game crucial winter ranges and migration corridors, on elk calving ranges, or on sites with less than 20% density of live sagebrush.	Sagebrush control would be allowed in sensitive wildlife habitat areas, subject to the use of restrictions to protect wildlife and wildlife habitat, and other provisions contained in environmental analyses.	Same as Alternative A	Same as Alternative B
	Sagebrush control would not be allowed within 500 feet of seeps, wet meadows, springs, reservoirs, irrigation ditches, perennial streams, and other wetland/riparian	Sagebrush control would be allowed within 500 feet of water unless site-specific environmental analyses indicated a need for the restriction.	Same as Alternative A	Same as Alternative B

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	habitats except for the purposes of wildlife habitat improvement.			
	Wetlands and fisheries habitat would be managed to improve and enhance values through restrictions in surface-disturbing activities and implementation of management practices such as planting vegetation, installing structures and fences, reducing sedimentation, acquiring water sources, developing springs, and maintaining reservoirs.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	So that existing prairie dog ecosystems could be maintained for the recovery of black-footed ferrets and burrowing owls and for better management of swift fox recovery, the use of poisons lethal to vertebrate animals would be avoided in the planning area. The use of poisons would be allowed only when no other control methods would be feasible or practical. Such use would be subject to established animal damage control procedures.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Chemical control of noxious weeds would be allowed in habitat for sensitive species.	Same as Alternative A	Chemical control of noxious weeds generally would be prohibited in areas designated as habitat for sensitive species. Exceptions would be considered only after environmental analysis and after consultation with county weed and pest control authorities regarding the need for treatment and methods of treatment.	Same as Alternative C
	For the protection of prey bases essential to the peregrine falcon and other birds, spraying of insecticides would not be allowed unless it was determined that economically important levels of insect infestation were present. Such spraying would be done only after the completion of site-specific environmental analyses. (More specific restrictions that would be applied locally	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 2 (Continued)

COMPARATIVE SUMMARY OF ALTERNATIVES

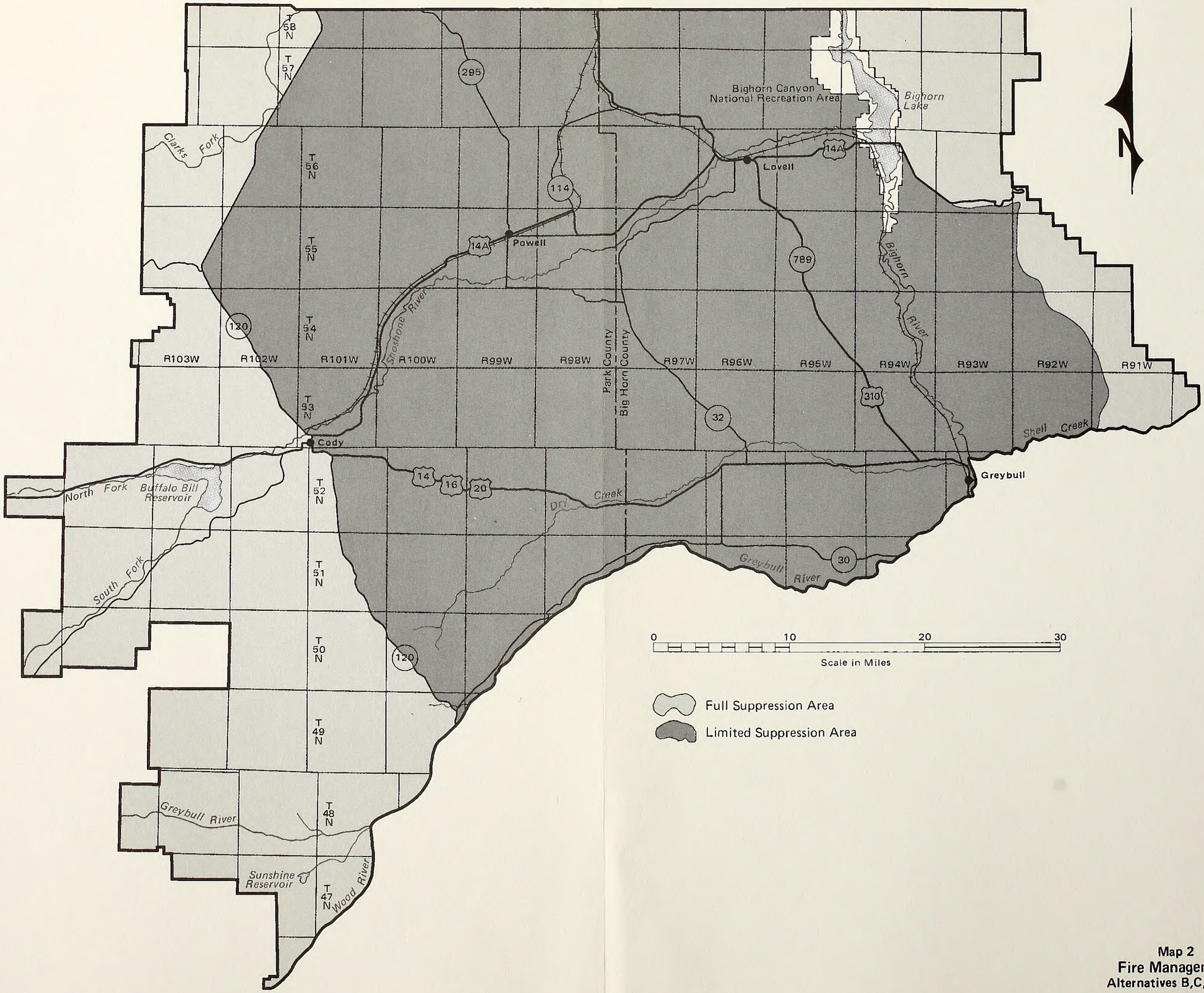
Management Actions by Resource Program[2]	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	in the Chapman bench proposed ACEC are described under "Chapman Bench" in table 4.)			

ABBREVIATIONS: ACEC = area of critical environmental concern; AMP = allotment management plan; AUM = animal unit month; BMP = best management practices; BOR = Bureau of Reclamation, U. S. Department of the Interior; "C," "I," or "M" Allotments—see "Allotment Categorization Process" in appendix G; C&MU = Classification and Multiple Use Act of 1964; ERMA = extensive recreation management area; HMP = habitat management plan; KGS = known geologic structure; MBF = thousand board feet; ORV = off-road vehicle; R&PP = Recreation and Public Purposes Act [43 USC 869 (a)]; RAMP = recreation area management plan; SRMA = special recreation management area; USFWS = U. S. Fish and Wildlife Service, Department of the Interior; VRM = visual resource management; WSA = wilderness study area. Many of these terms are further defined in the Glossary.

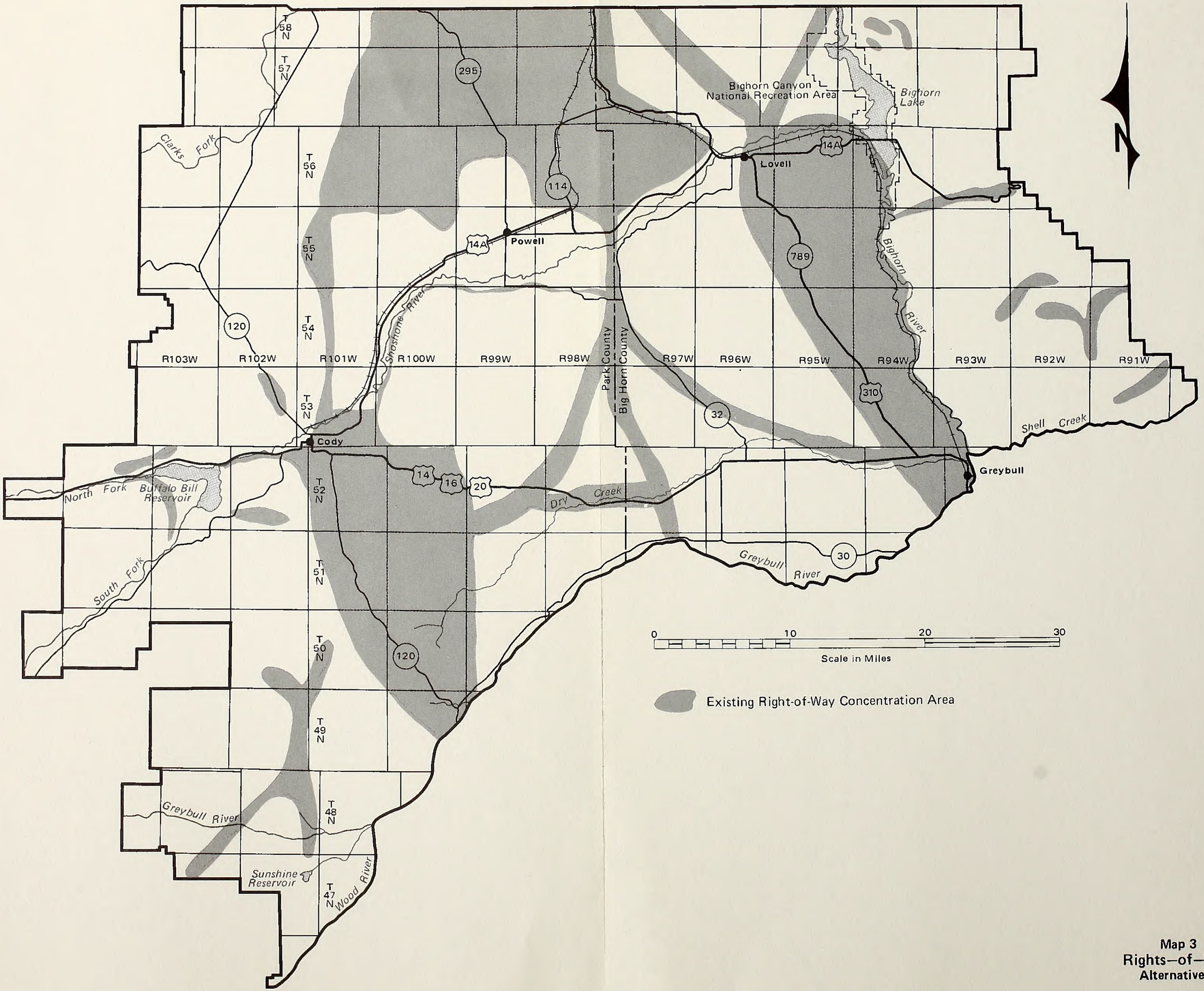
[1] The general types of restrictions on surface-disturbing activities that would be applied in the planning area have been developed through the planning process and application of the Wyoming BLM standard mitigation guidelines (see appendix B). Restrictions on surface-disturbing activities are described first because all management actions generally would operate within these land use constraints.

[2] Anticipated levels of activity are defined under separate subheadings in the following sections: Geothermal Resources, Leasable Minerals—Coal, Leasable Minerals—Oil and Gas, Locatable Minerals, Salable Minerals, Landownership Adjustments, and Utility/Transportation Systems. In other programs, anticipated levels of activity are quantified under "Management Actions."

[3] Appendix D contains more information on cultural resource management.

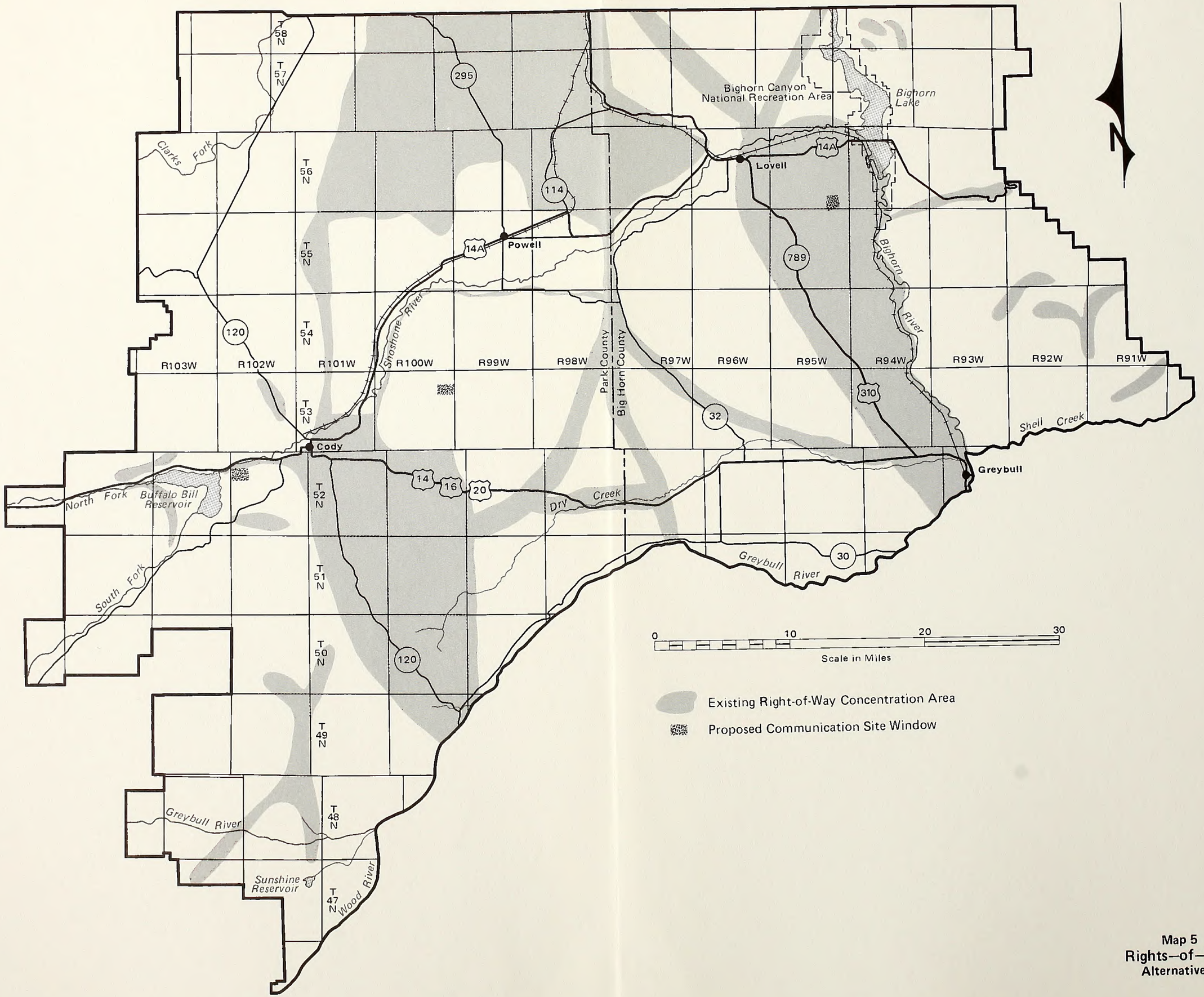


Map 2
Fire Management
Alternatives B,C, and D



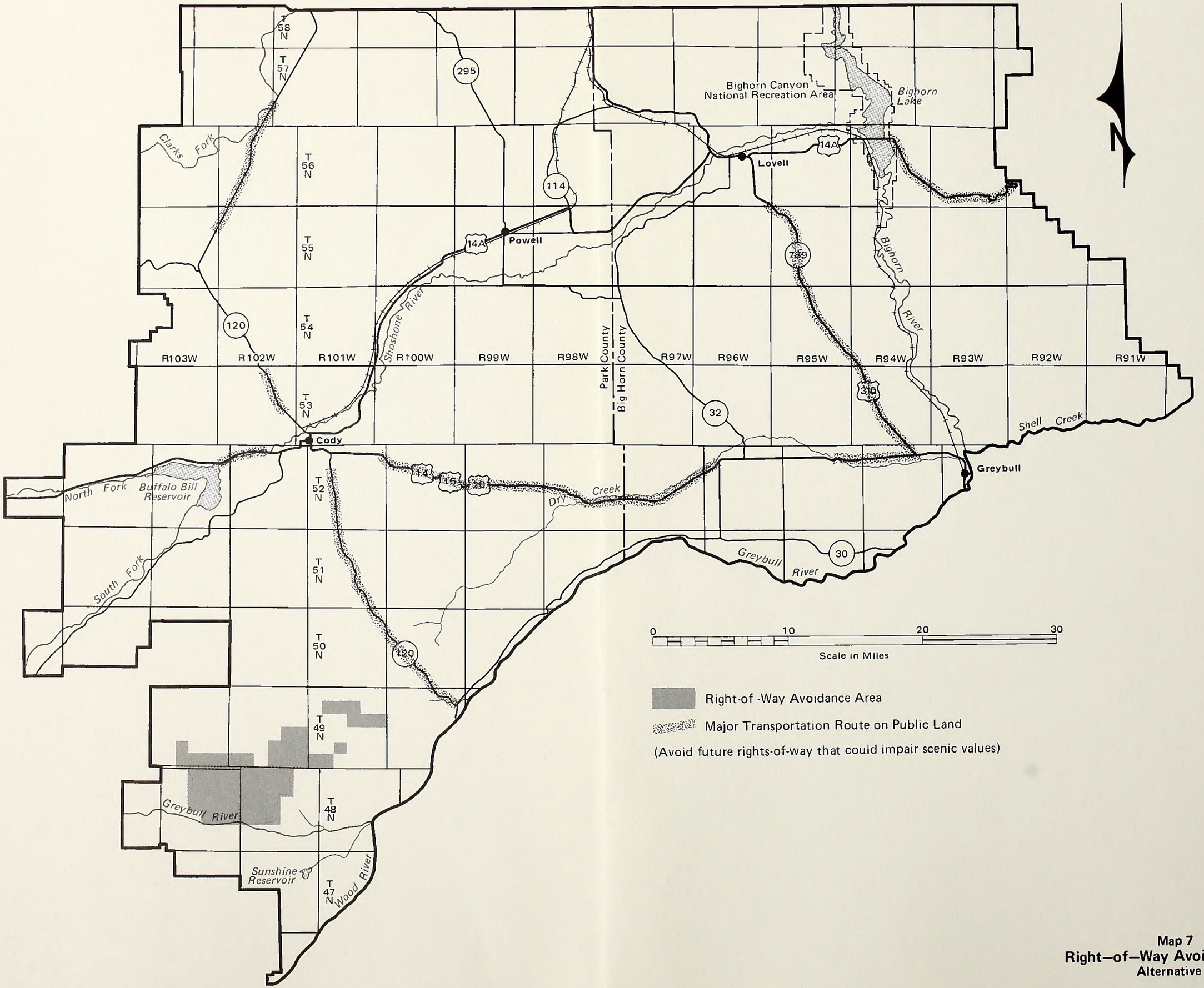
Map 3
Rights–of–Way
Alternative A

Map 4
Rights—of—Way
Alternative B

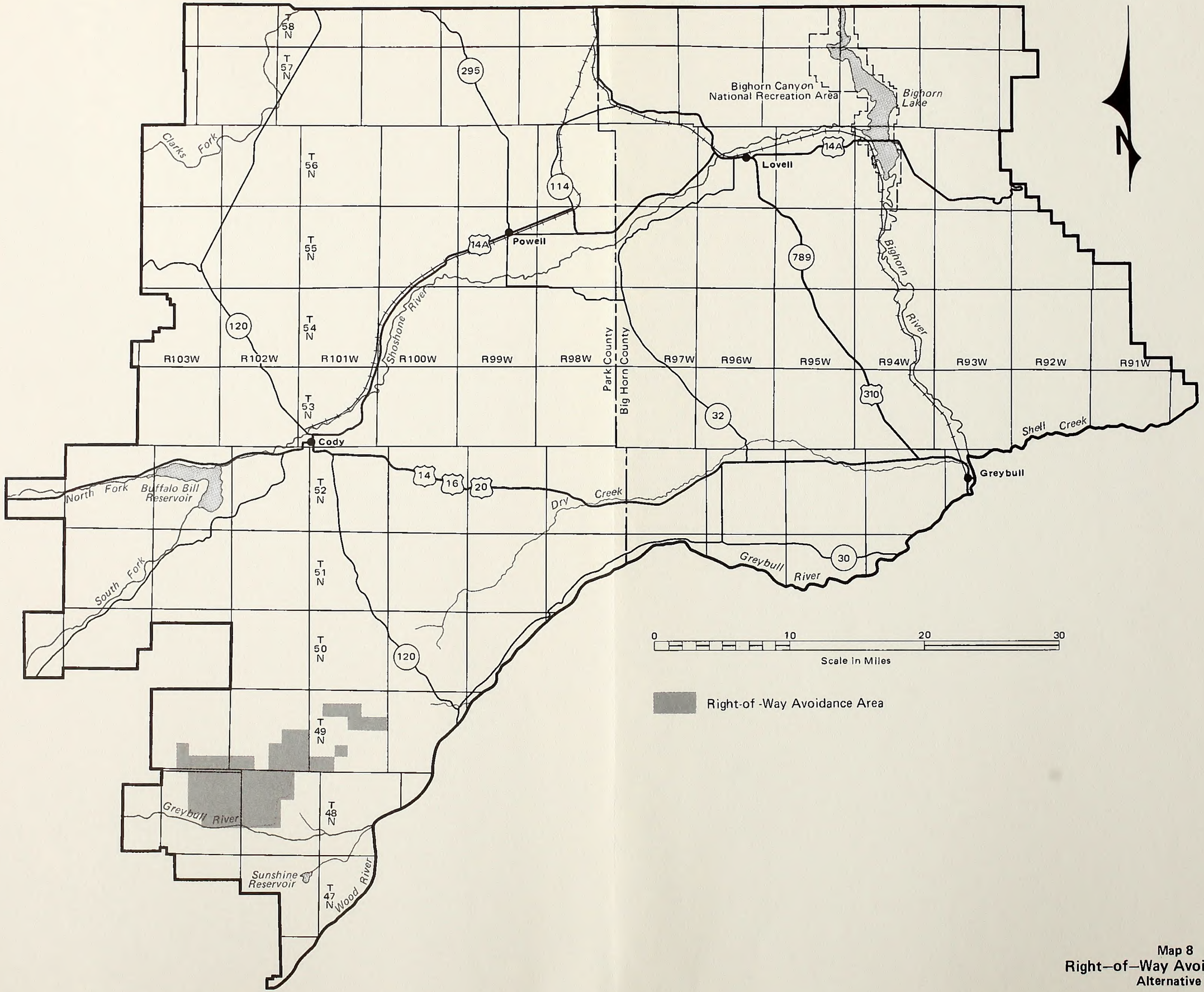


Map 5
Rights–of–Way
Alternative C

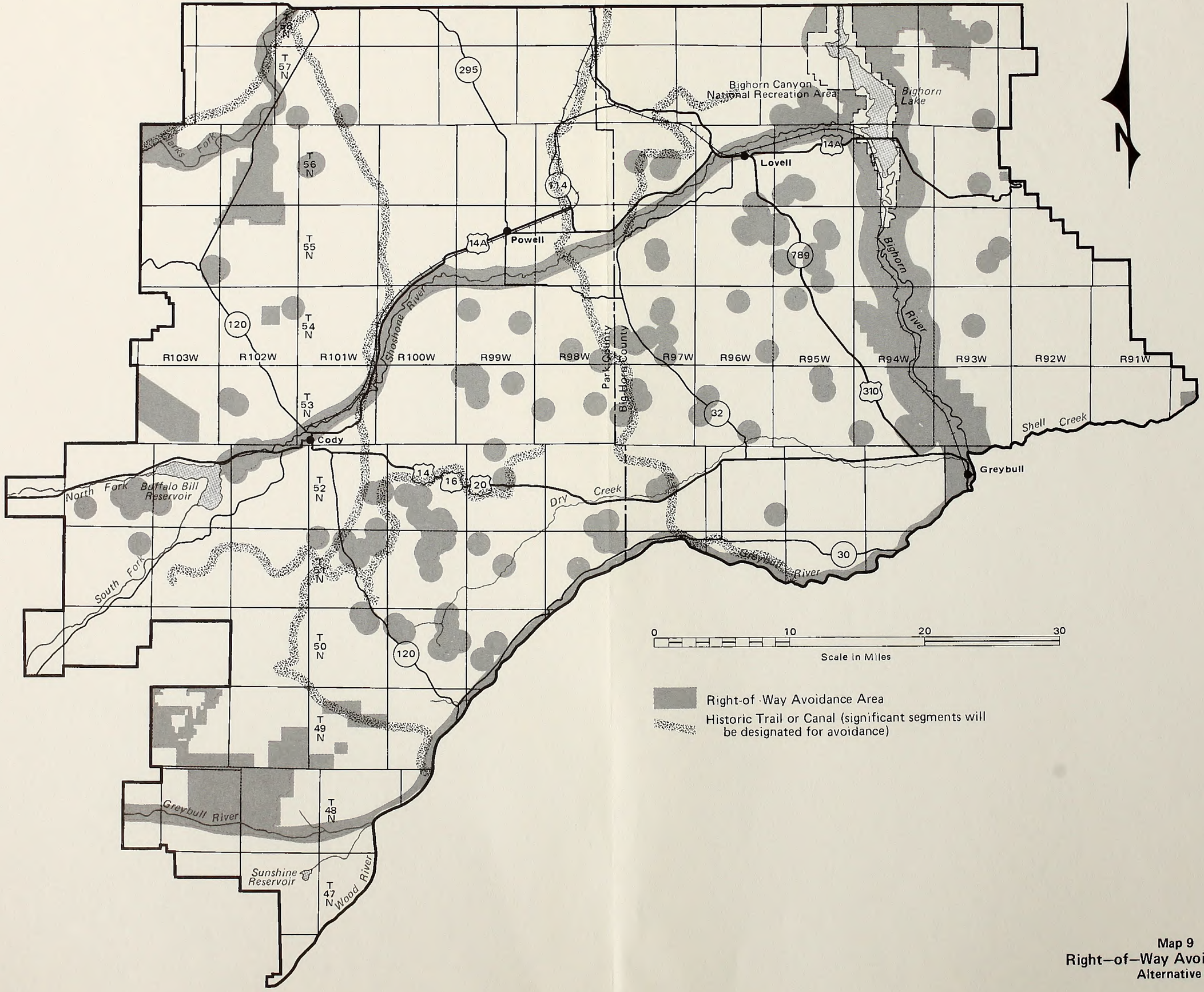
Map 6
Rights--of--Way
Alternative D



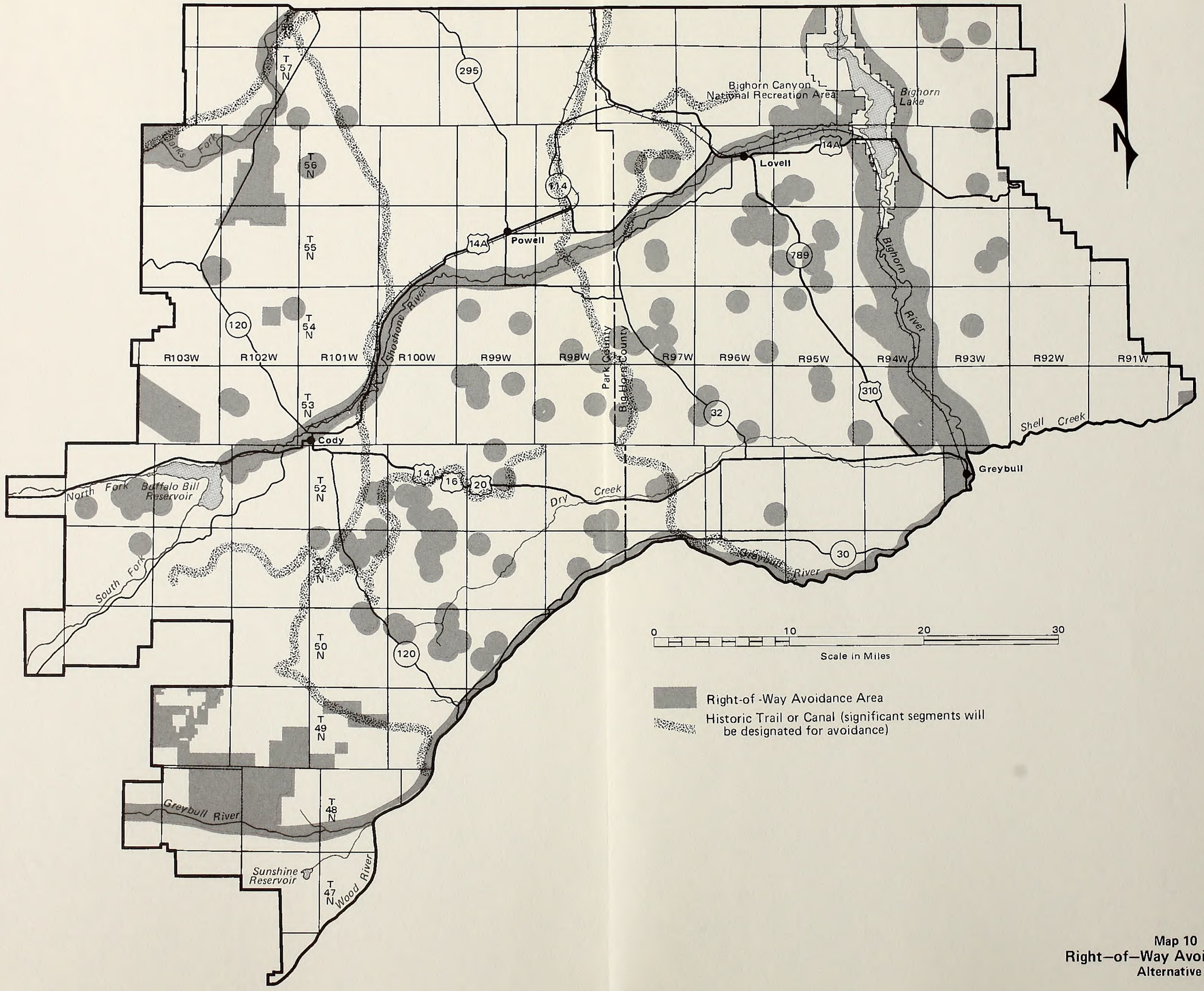
Map 7
Right–of–Way Avoidance Areas
Alternative A



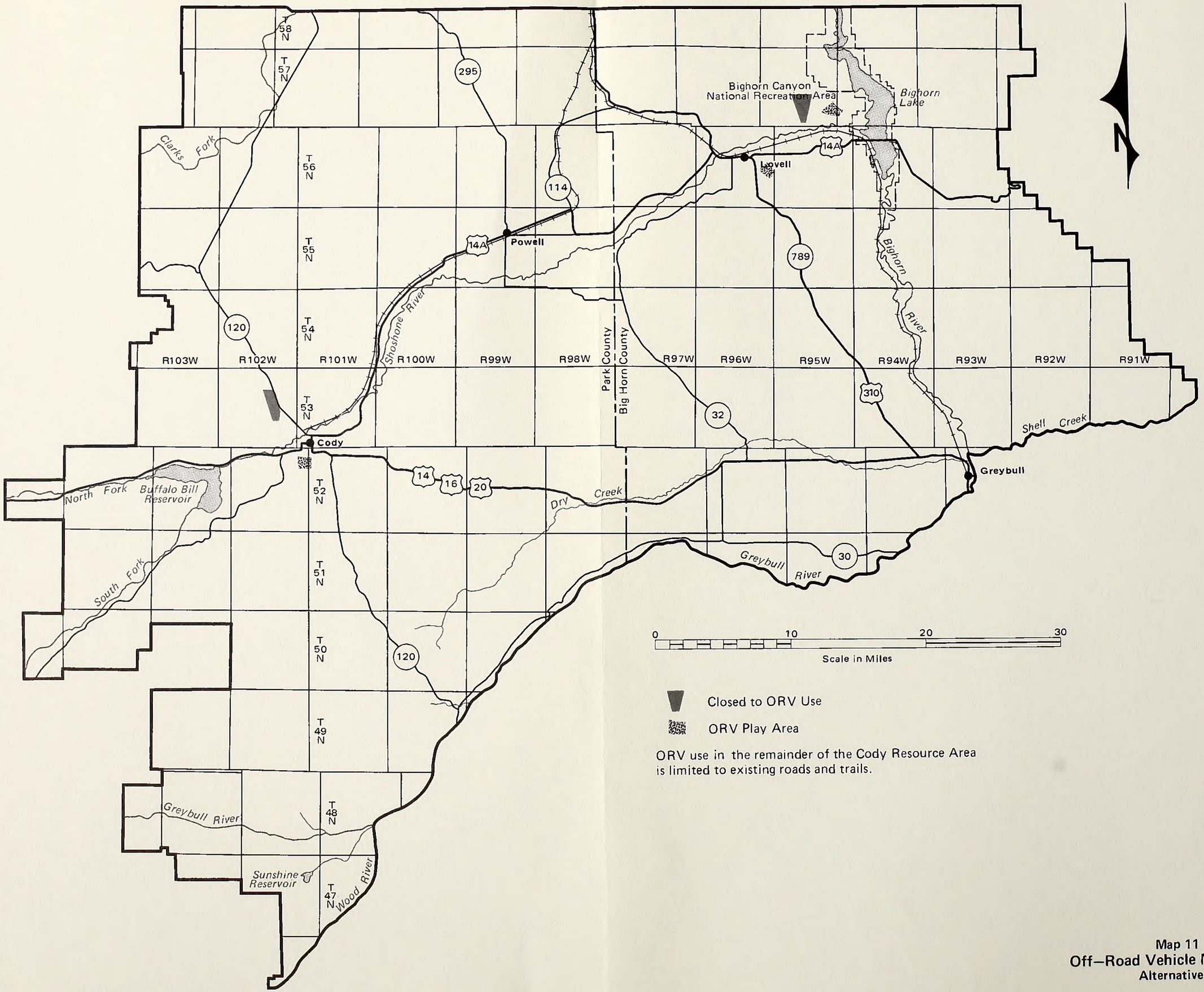
Map 8
Right–of–Way Avoidance Areas
Alternative B



Map 9
Right–of–Way Avoidance Areas
Alternative C



Map 10
Right—of—Way Avoidance Areas
Alternative D

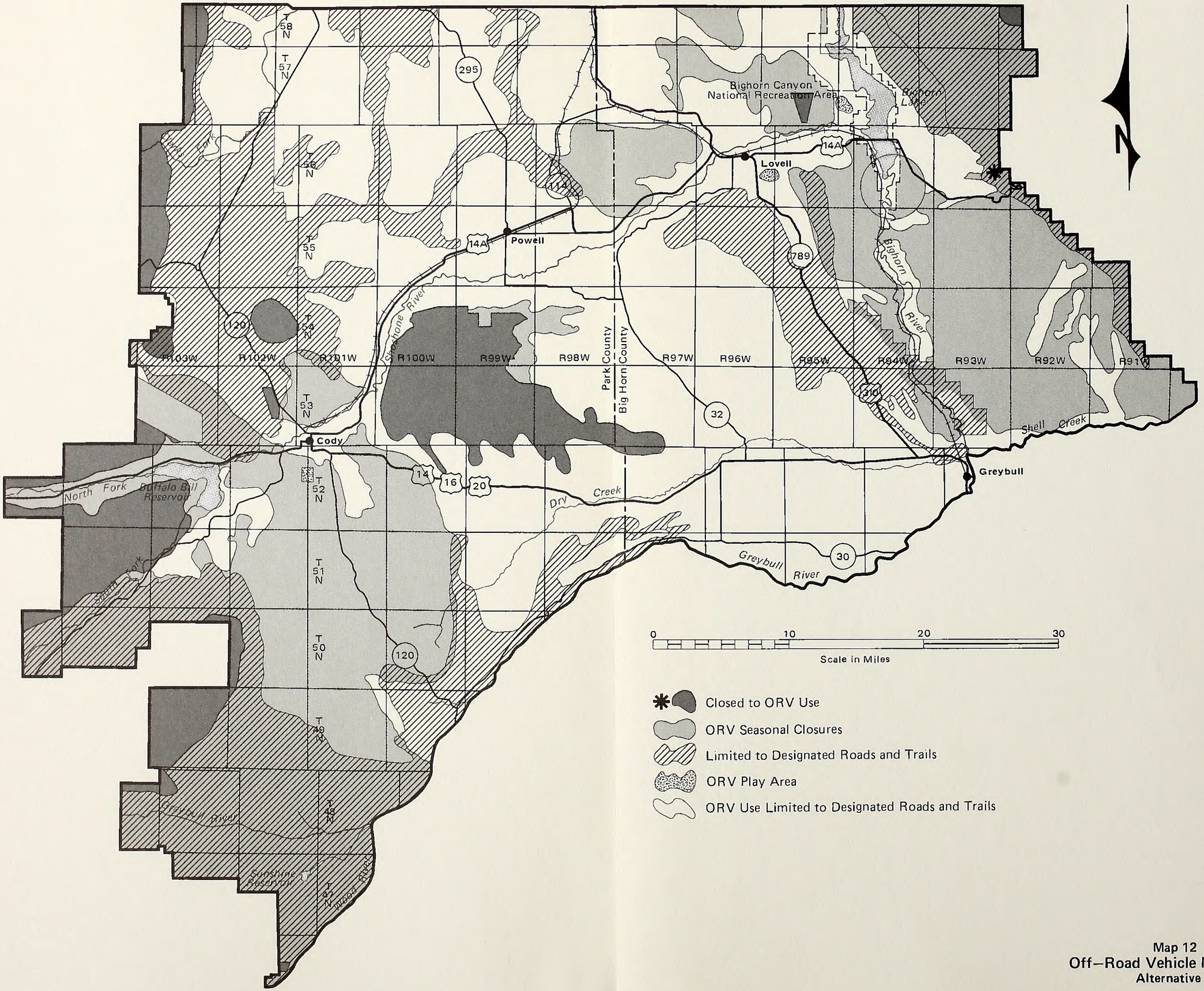


Closed to ORV Use

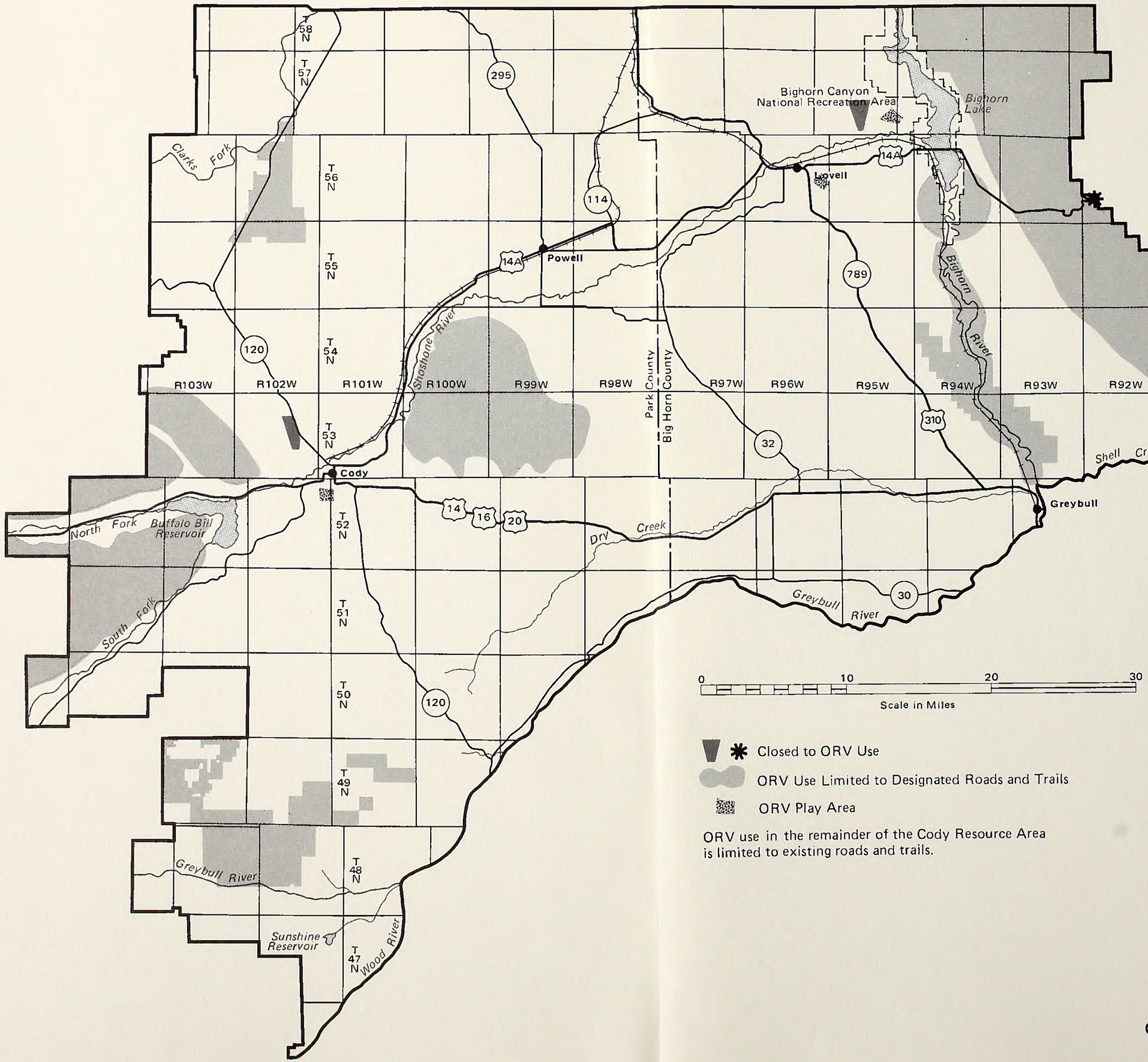
ORV Play Area

ORV use in the remainder of the Cody Resource Area is limited to existing roads and trails.

Map 11
Off–Road Vehicle Management
Alternative B

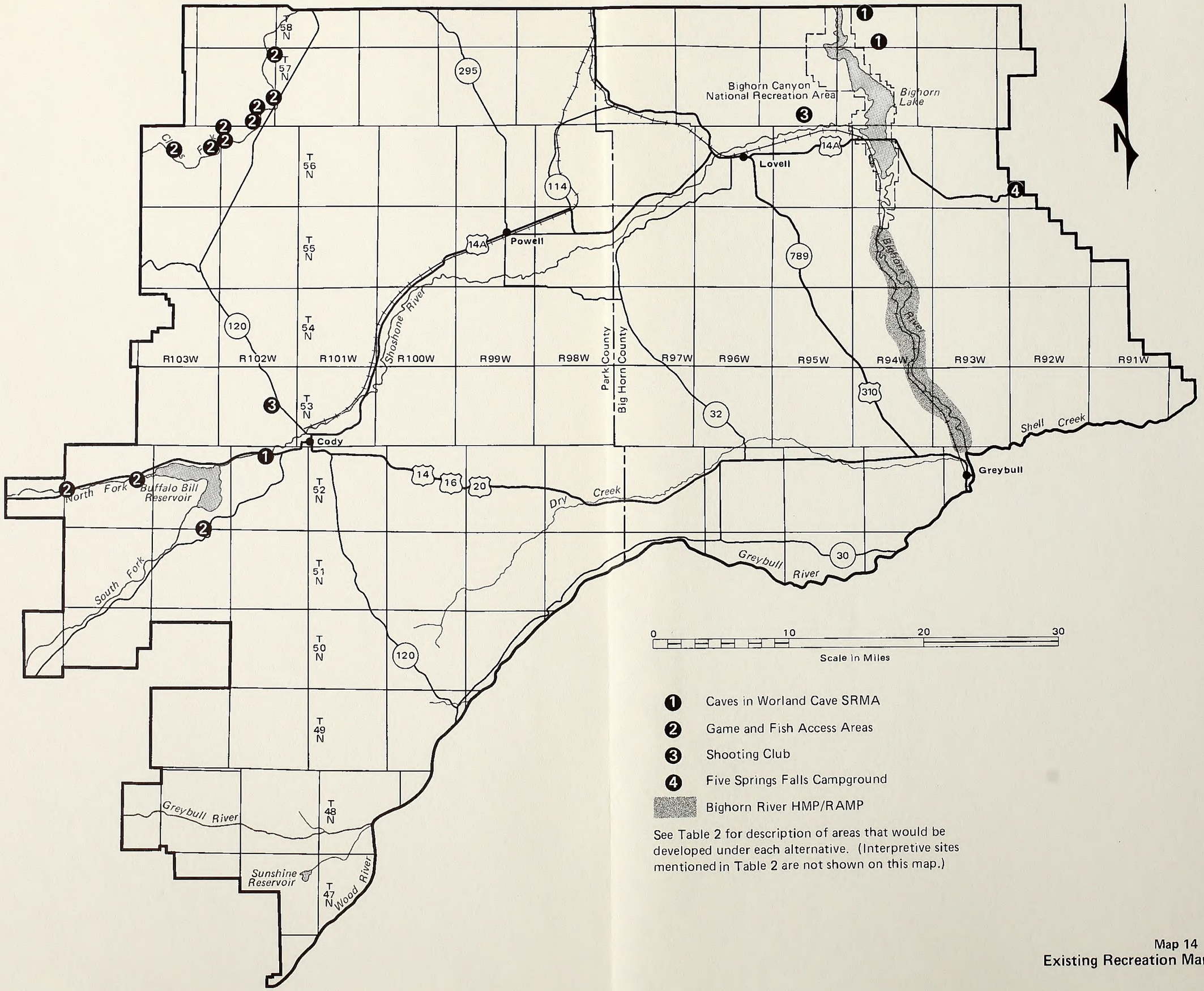


Map 12
Off–Road Vehicle Mangement
Alternative C



ORV use in the remainder of the Cody Resource Area is limited to existing roads and trails.

Map 13
Off–Road Vehicle Management
Alternative D

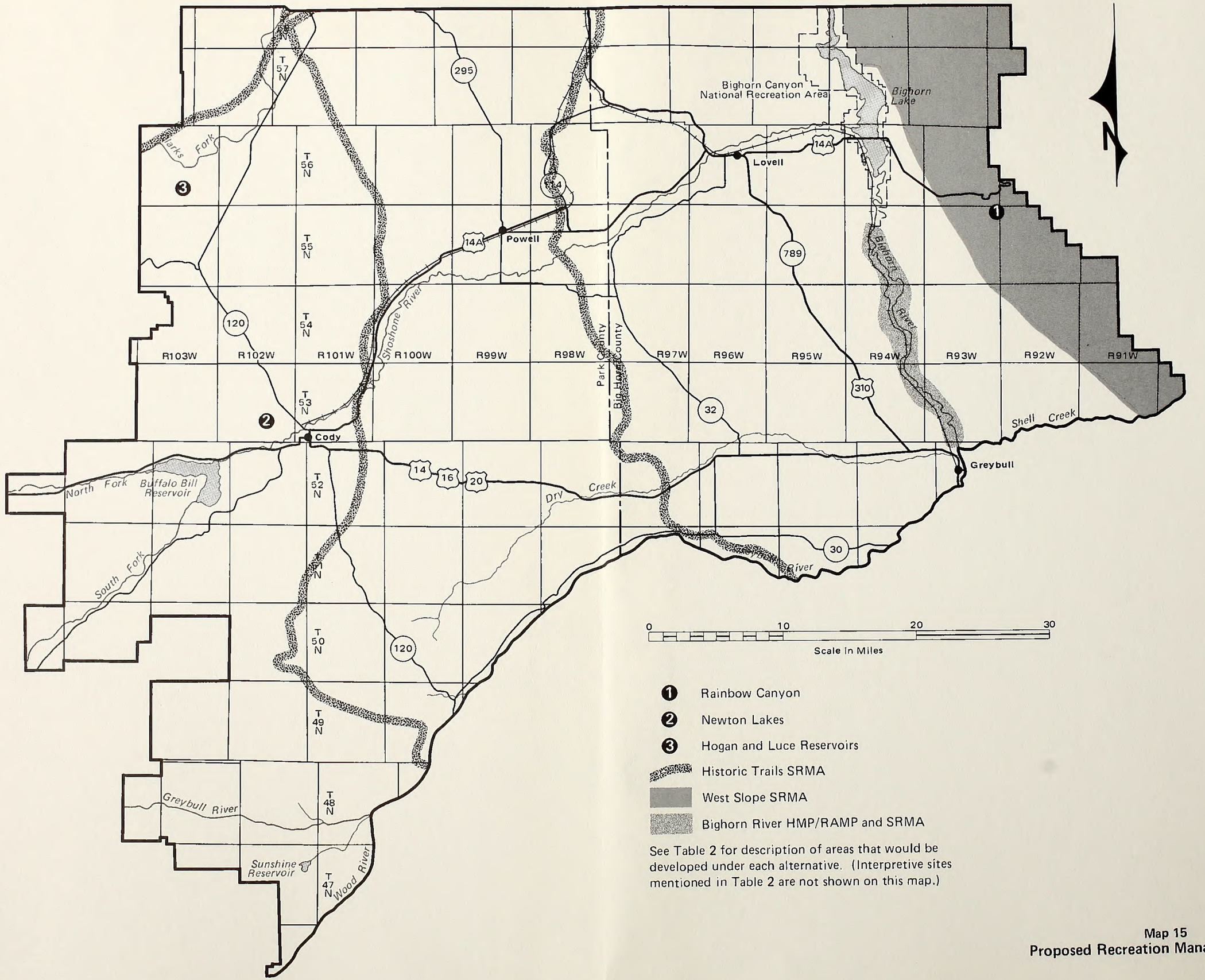


1. Caves in Worland Cave SRMA
2. Game and Fish Access Areas
3. Shooting Club
4. Five Springs Falls Campground

Bighorn River HMP/RAMP

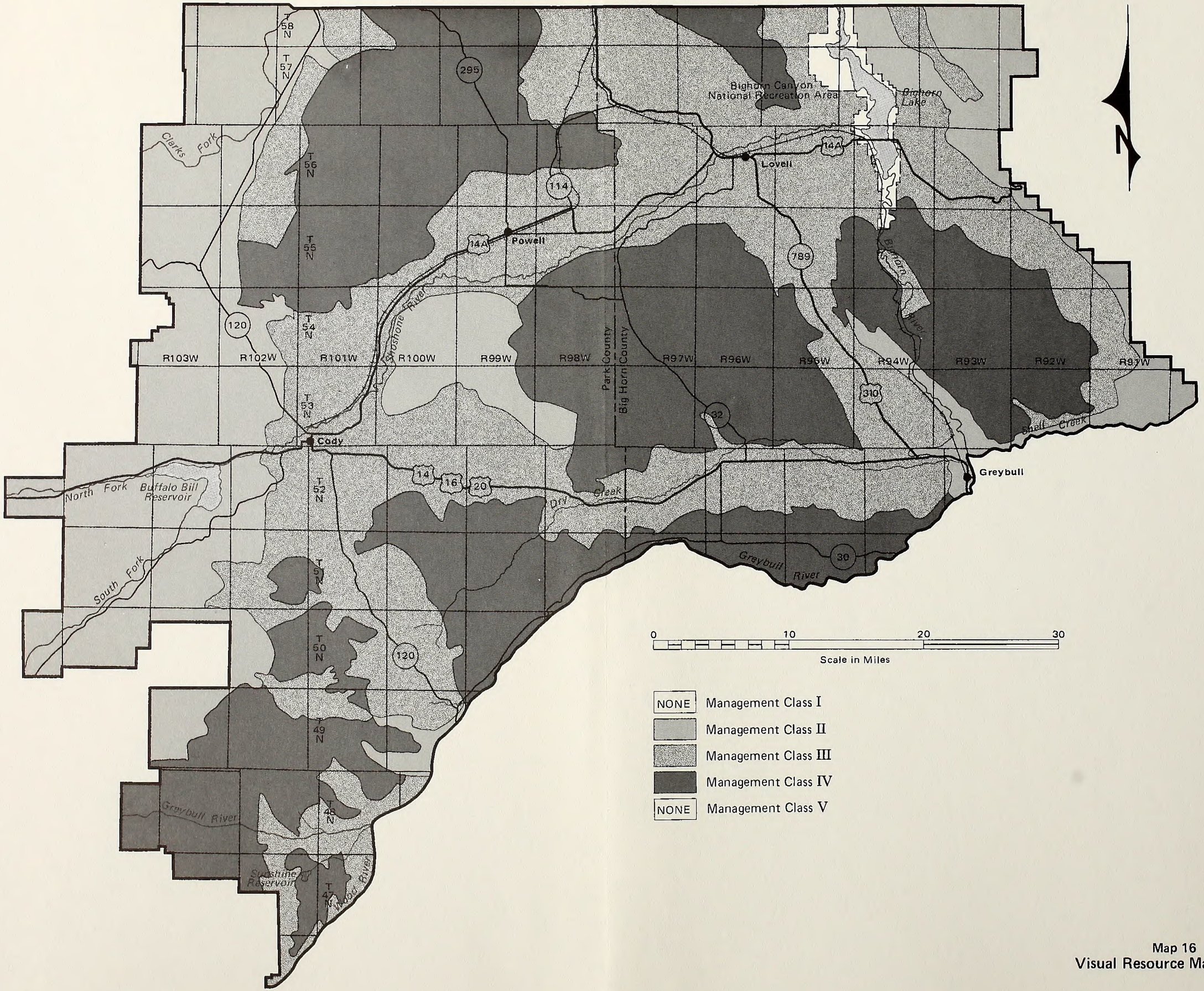
See Table 2 for description of areas that would be developed under each alternative. (Interpretive sites mentioned in Table 2 are not shown on this map.)

Map 14
Existing Recreation Management Areas



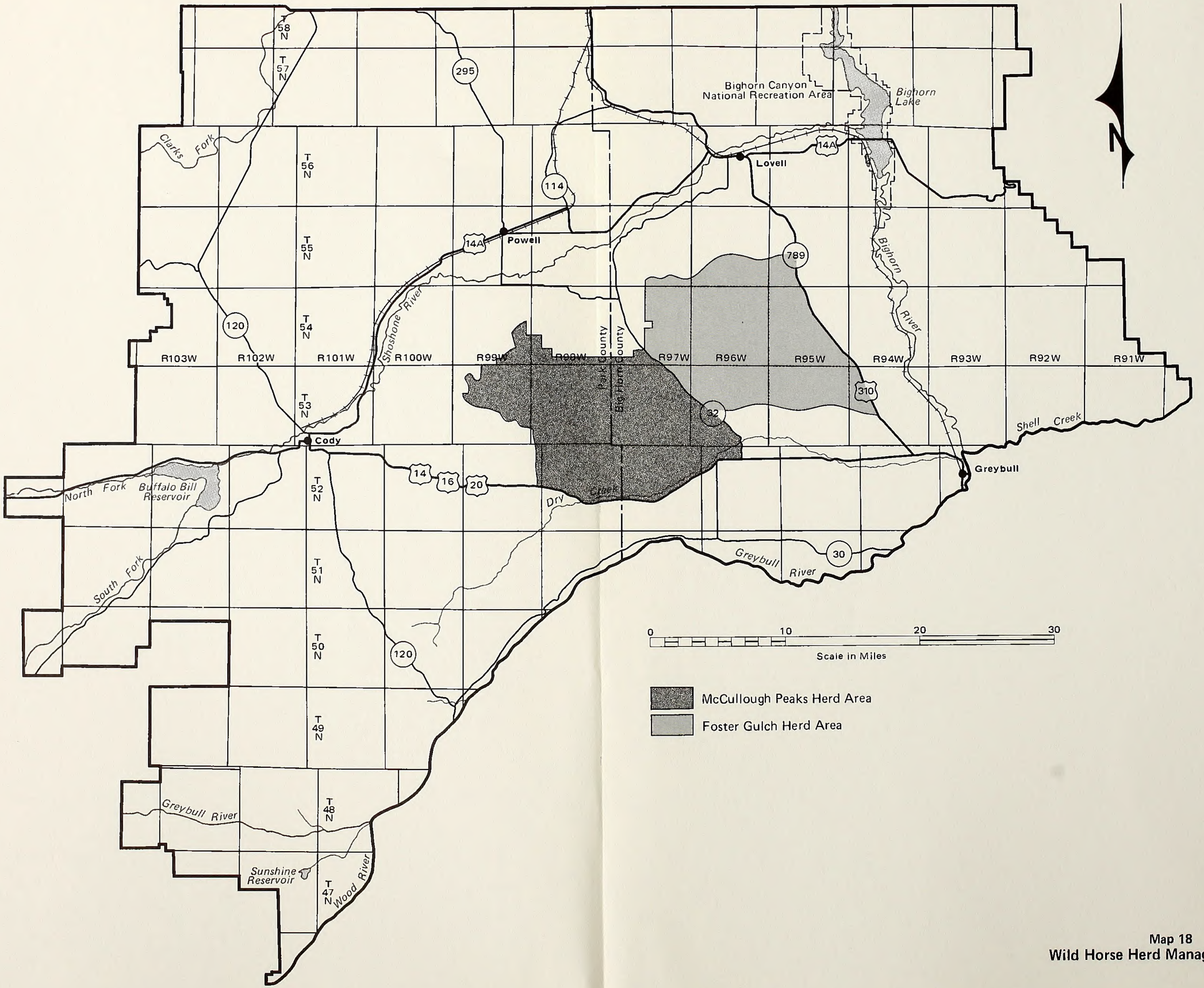
See Table 2 for description of areas that would be developed under each alternative. (Interpretive sites mentioned in Table 2 are not shown on this map.)

Map 15
Proposed Recreation Management Areas

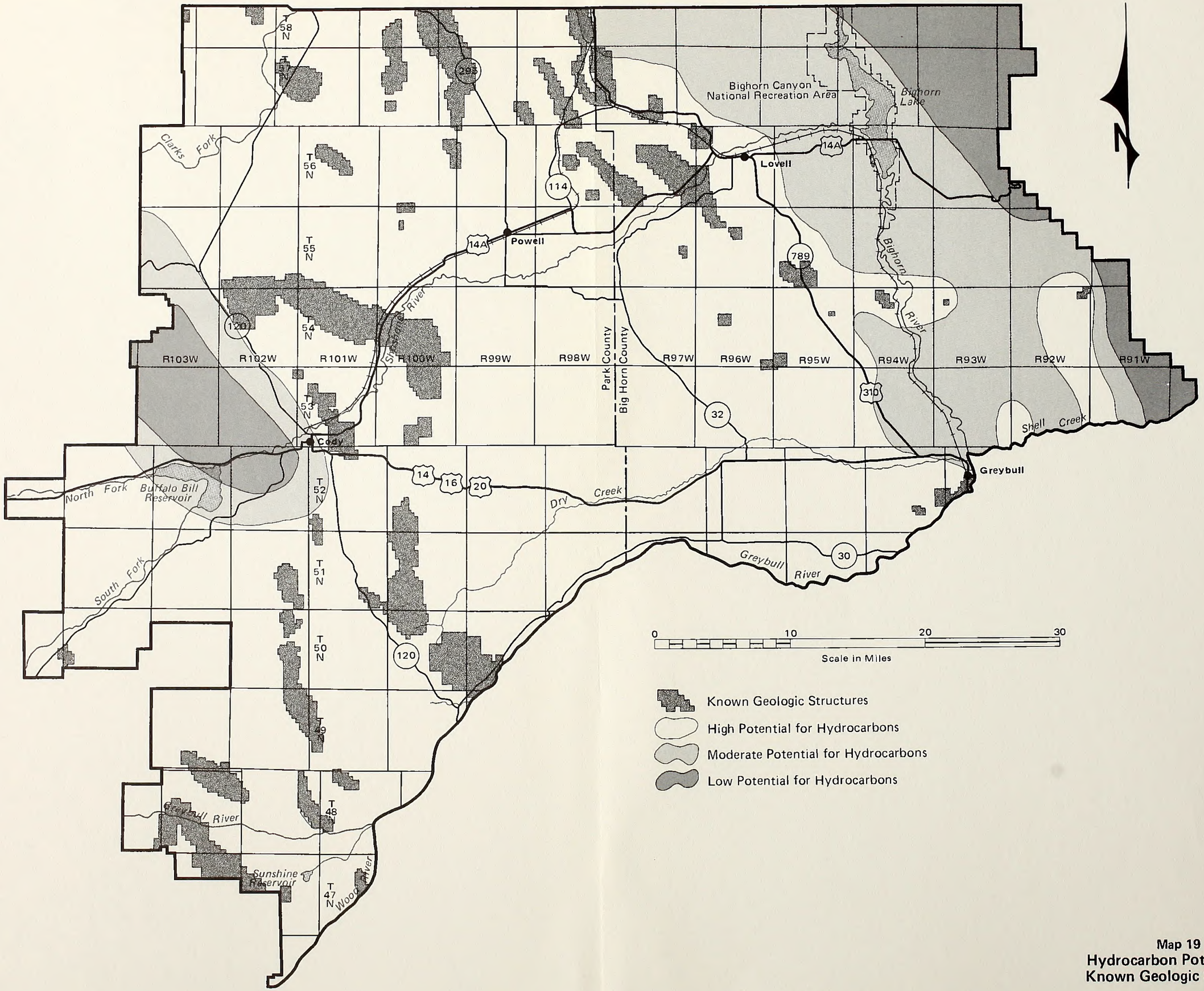


Map 16
Visual Resource Management

Map 17
Watershed Management
Alternative C



Map 18
Wild Horse Herd Management Areas



Map 19
Hydrocarbon Potential and Known Geologic Structures

TABLE 3

RESTRICTIONS ON SURFACE DISTURBANCE IN AREAS WITH HIGH, MODERATE OR LOW HYDROCARBON POTENTIAL

Type of Restriction	Area Affected in Each Category (percentage)[1] Alternative A	B	C[2]	D[3]
High Potential Areas—1,101,000 Acres				
No leasing	1.3	1.3	1.9	1.3
"No surface occupancy" restrictions[4]	3.6	0.9	8.1	2.0
No surface use or activity[5]	14.5	14.5	10.5	14.5
Surface occupancy allowed for more than 6 months[6]	72.1	82.0	70.3	73.0
Seasonal restrictions—Open 3 to 6 months	8.4	1.2	9.1	9.1
Seasonal restrictions—Open less than 3 months	0.1	0.1	0.1	0.1
Moderate Potential Areas—286,600 Acres				
No leasing	0	0	0.5	0
"No surface occupancy" restrictions[4]	6.0	3.8	17.6	6.4
No surface use or activity[5]	11.5	11.5	7.5	11.5
Surface occupancy allowed for more than 6 months[6]	82.2	84.4	74.1	81.8
Seasonal restrictions—Open 3 to 6 months	0.3	0.3	0.3	0.3
Seasonal restrictions—Open less than 3 months	0	0	0	0
Low Potential Areas—120,600 Acres				
No leasing	0	0	0.1	0
"No surface occupancy" restrictions[4]	7.3	1.7	17.9	4.9
No surface use or activity[5]	21.0	21.0	19.7	21.0
Surface occupancy allowed for more than 6 months[6]	67.9	73.5	58.5	70.3
Seasonal restrictions—Open 3 to 6 months	3.6	3.6	3.6	3.6
Seasonal restrictions—Open less than 3 months	0.2	0.2	0.2	0.2

Note: KGSs are shown in map 19; areas in which oil and gas activities are restricted are shown on maps 20 through map 29.

[1] Percentage of federal mineral estate in this category on which these restrictions would be applied.

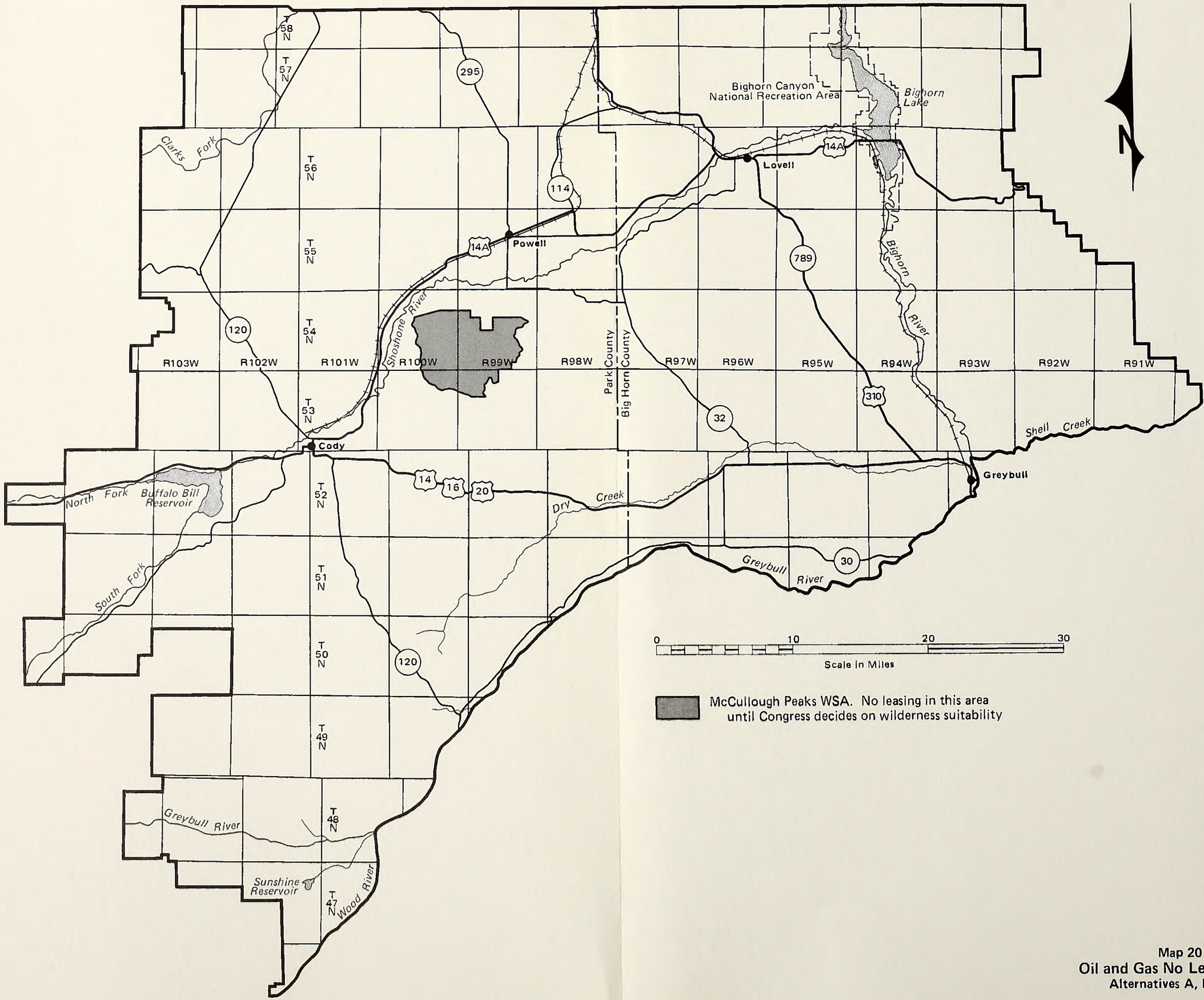
[2] Percentages in Alternative C reflect the maximum level of restriction that could be applied if conditional "no surface occupancy" measures were invoked to protect sage grouse and sharp-tailed grouse in the proposed Chapman Bench Area of Critical Environmental Concern.

[3] Percentages in Alternative D reflect the maximum level of restriction that could be applied if conditional "no surface occupancy" measures were invoked to protect the proposed Chapman Bench Area of Critical Environmental Concern.

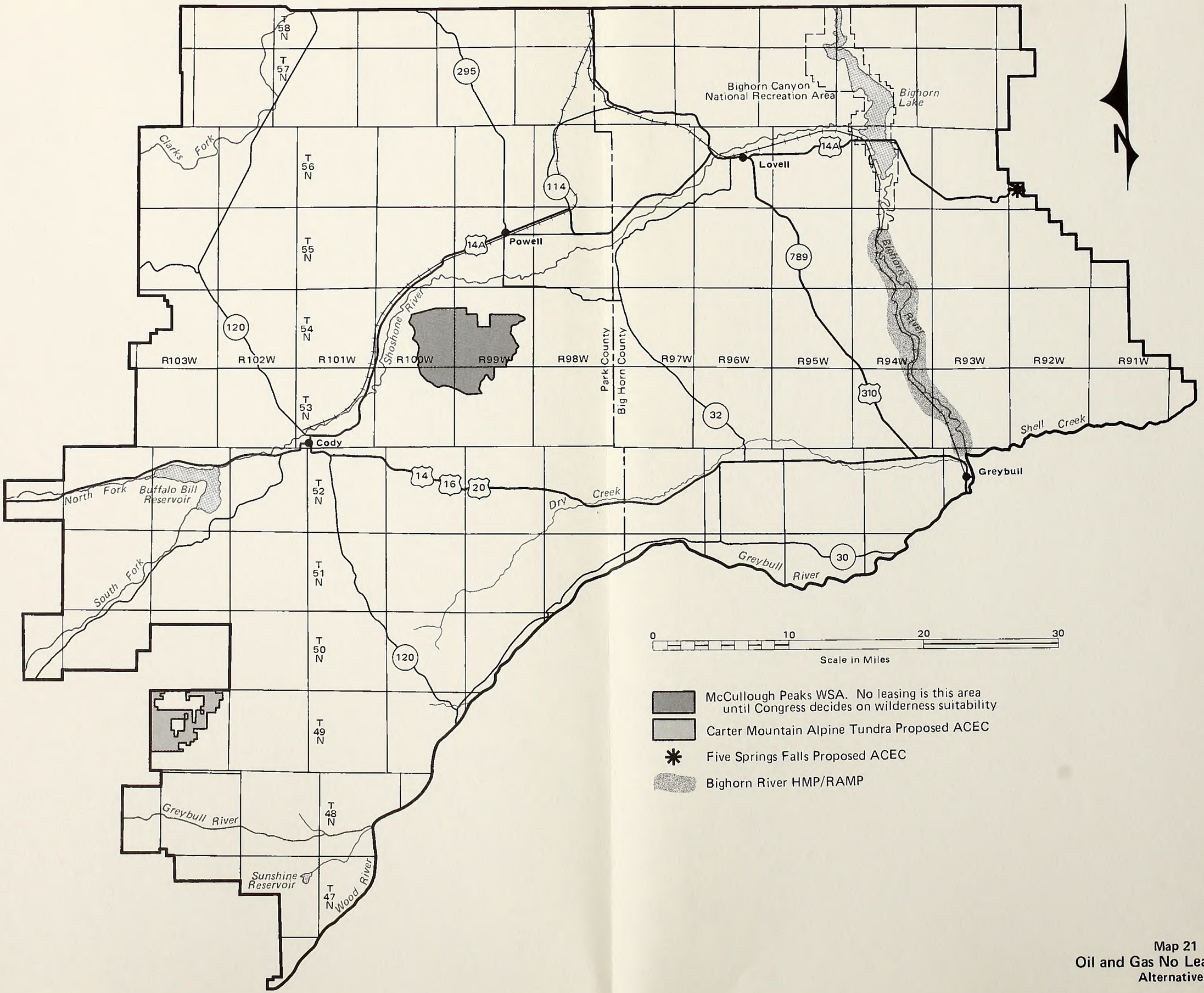
[4] A plan amendment would be required before this restriction could be waived. This involves a *Federal Register* notice of the proposed changes and a public comment period.

[5] This restriction, which usually is applied to protect wildlife resources, could be waived by the authorized officer without the need for a plan amendment.

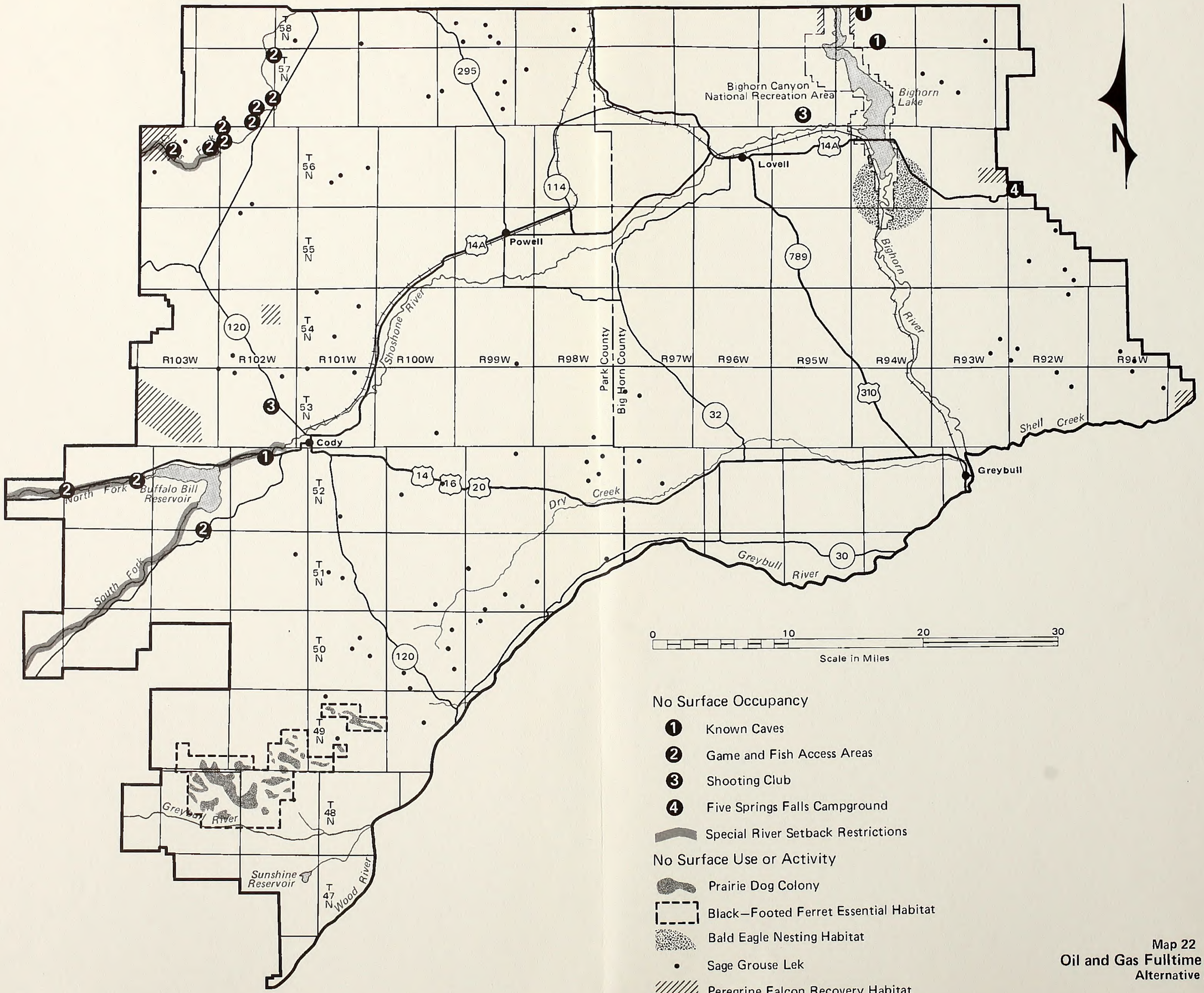
[6] Includes lands with seasonal restrictions and lands subject to standard surface disturbance mitigative measures that limit activities on slopes and in scenic areas or protect riparian areas and historic trails. (Mitigative measures are detailed in appendix B.)



Map 20
Oil and Gas No Leasing Areas
Alternatives A, B, and D



Map 21
Oil and Gas No Leasing Areas
Alternative C



No Surface Occupancy

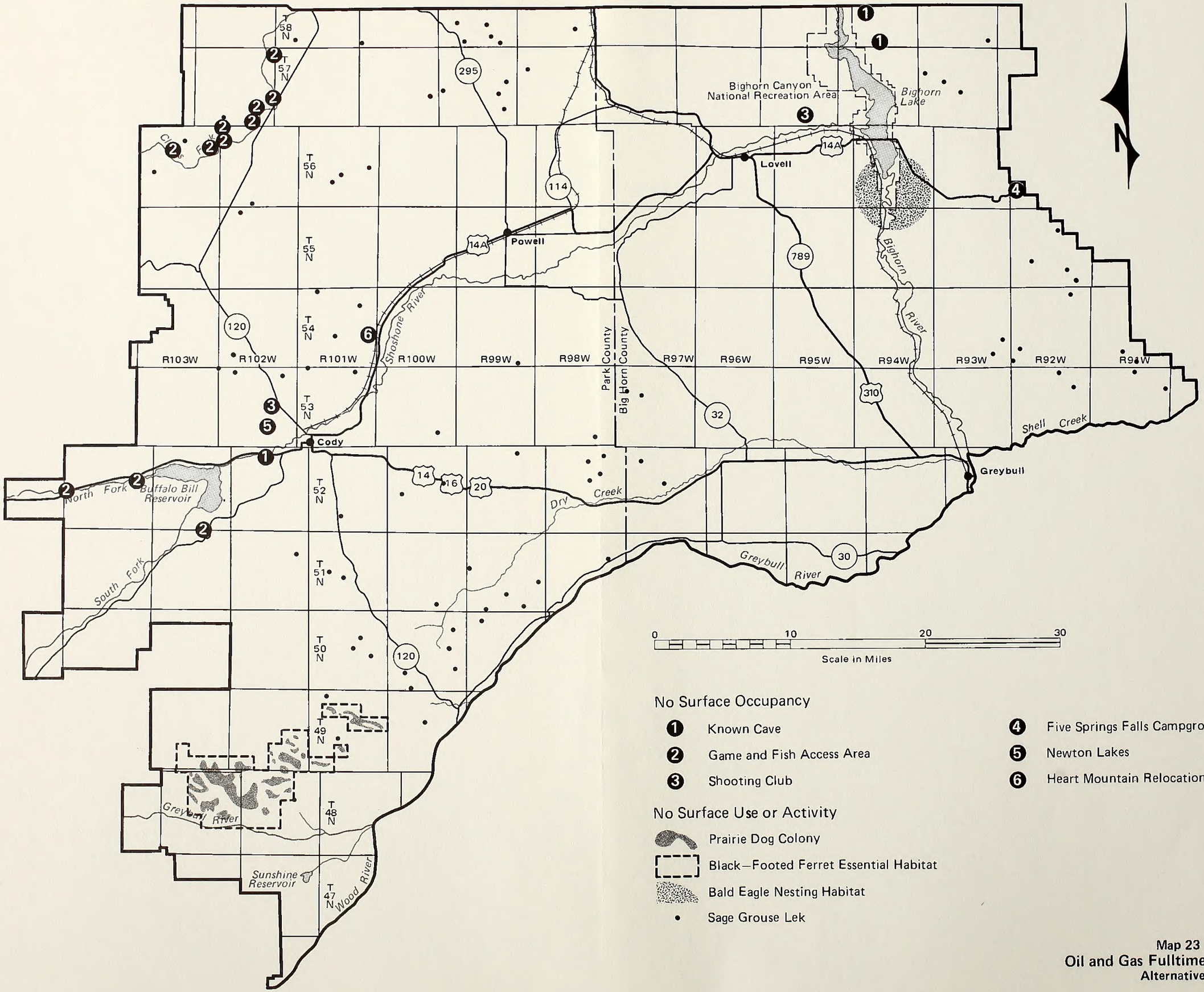
1. Known Caves
2. Game and Fish Access Areas
3. Shooting Club
4. Five Springs Falls Campground

Special River Setback Restrictions

No Surface Use or Activity

- Prairie Dog Colony
- Black–Footed Ferret Essential Habitat
- Bald Eagle Nesting Habitat
- Sage Grouse Lek
- Peregrine Falcon Recovery Habitat (applies to new oil and gas leases)

Map 22
Oil and Gas Fulltime Restrictions
Alternative A



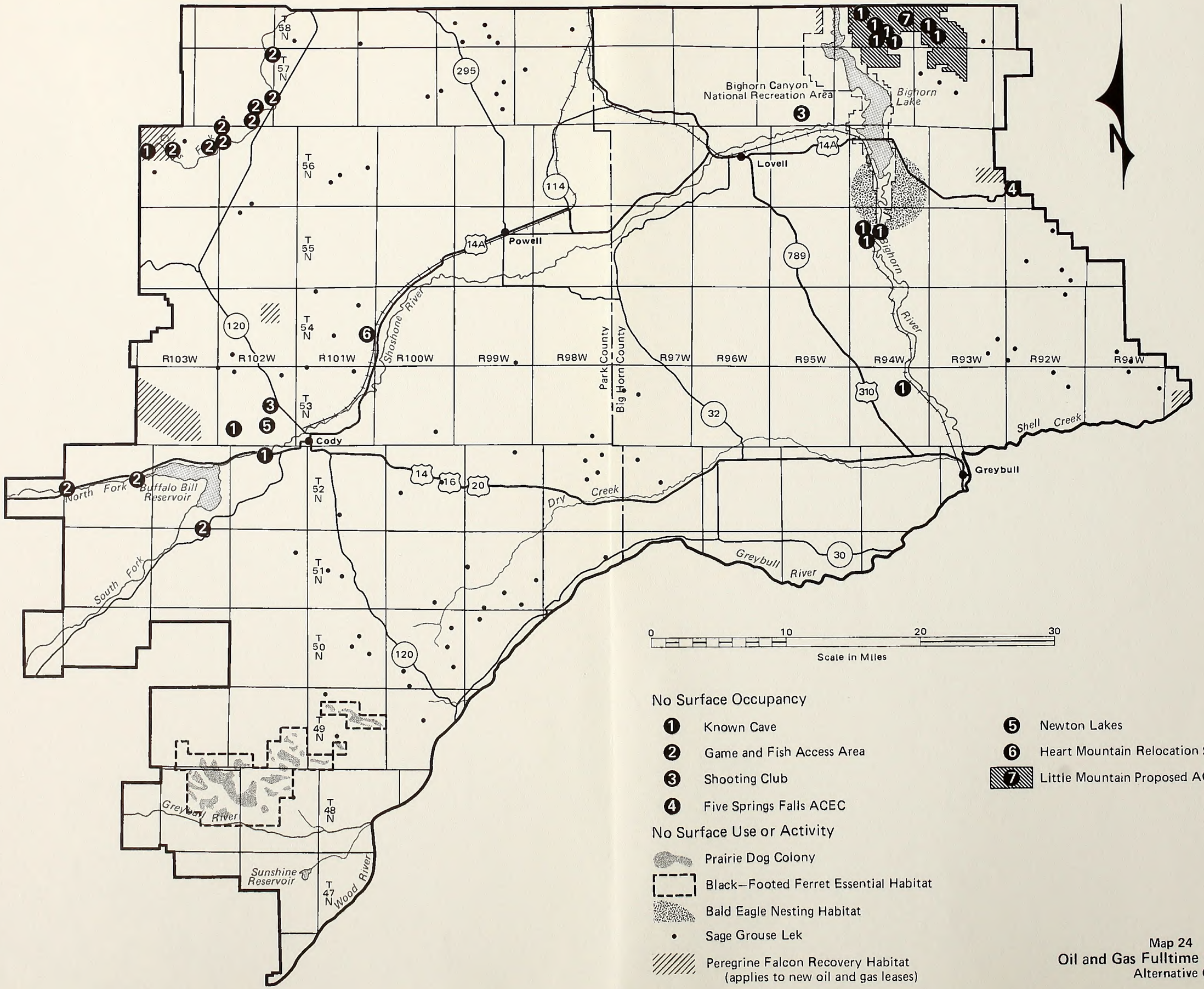
No Surface Occupancy

1. Known Cave
2. Game and Fish Access Area
3. Shooting Club
4. Five Springs Falls Campground
5. Newton Lakes
6. Heart Mountain Relocation Site

No Surface Use or Activity

- Prairie Dog Colony
- Black–Footed Ferret Essential Habitat
- Bald Eagle Nesting Habitat
- Sage Grouse Lek

Map 23
Oil and Gas Fulltime Restrictions
Alternative B



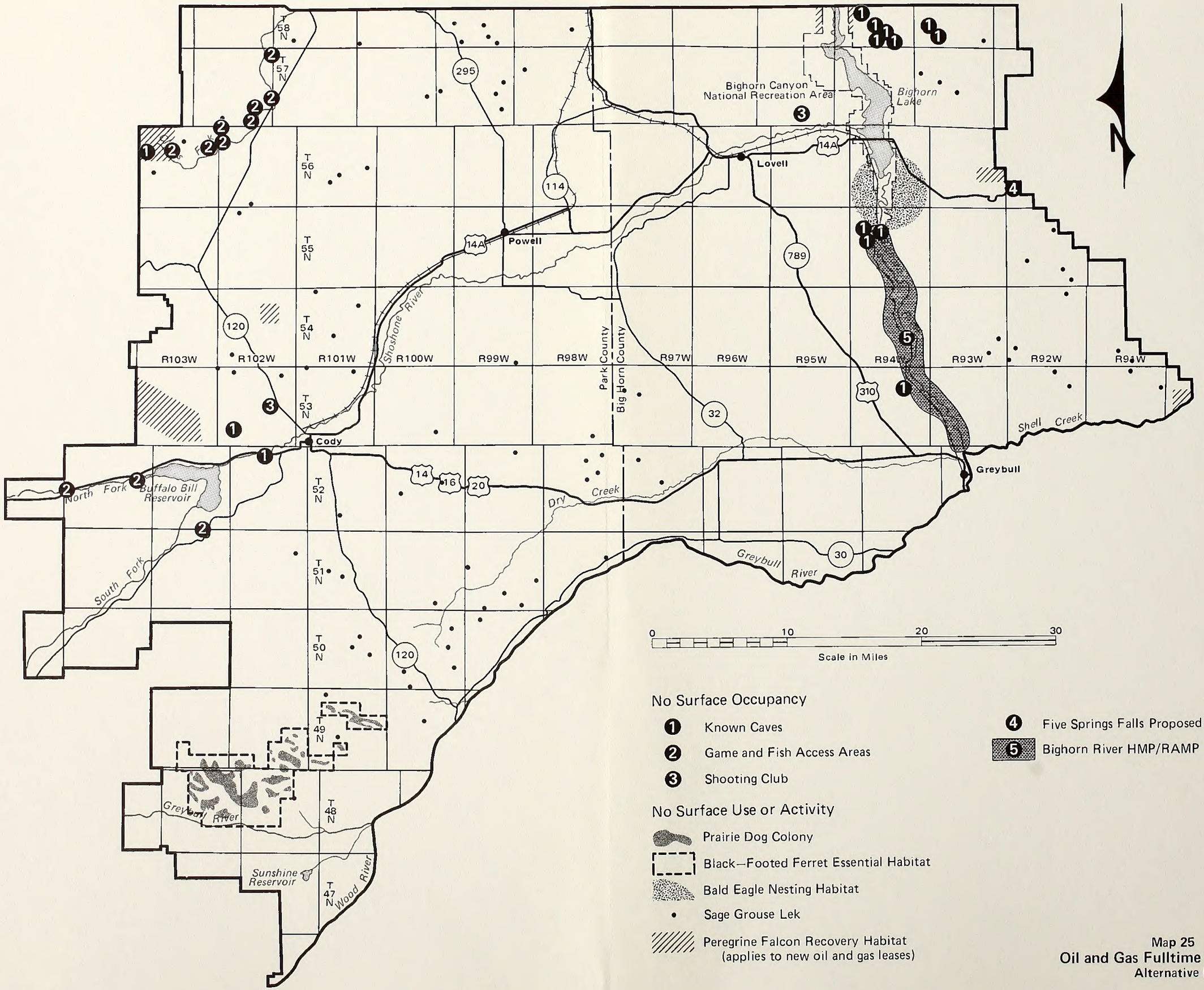
No Surface Occupancy

1. Known Cave
2. Game and Fish Access Area
3. Shooting Club
4. Five Springs Falls ACEC
5. Newton Lakes
6. Heart Mountain Relocation Site
7. Little Mountain Proposed ACEC

No Surface Use or Activity

- Prairie Dog Colony
- Black–Footed Ferret Essential Habitat
- Bald Eagle Nesting Habitat
- Sage Grouse Lek
- Peregrine Falcon Recovery Habitat (applies to new oil and gas leases)

Map 24
Oil and Gas Fulltime Restrictions
Alternative C



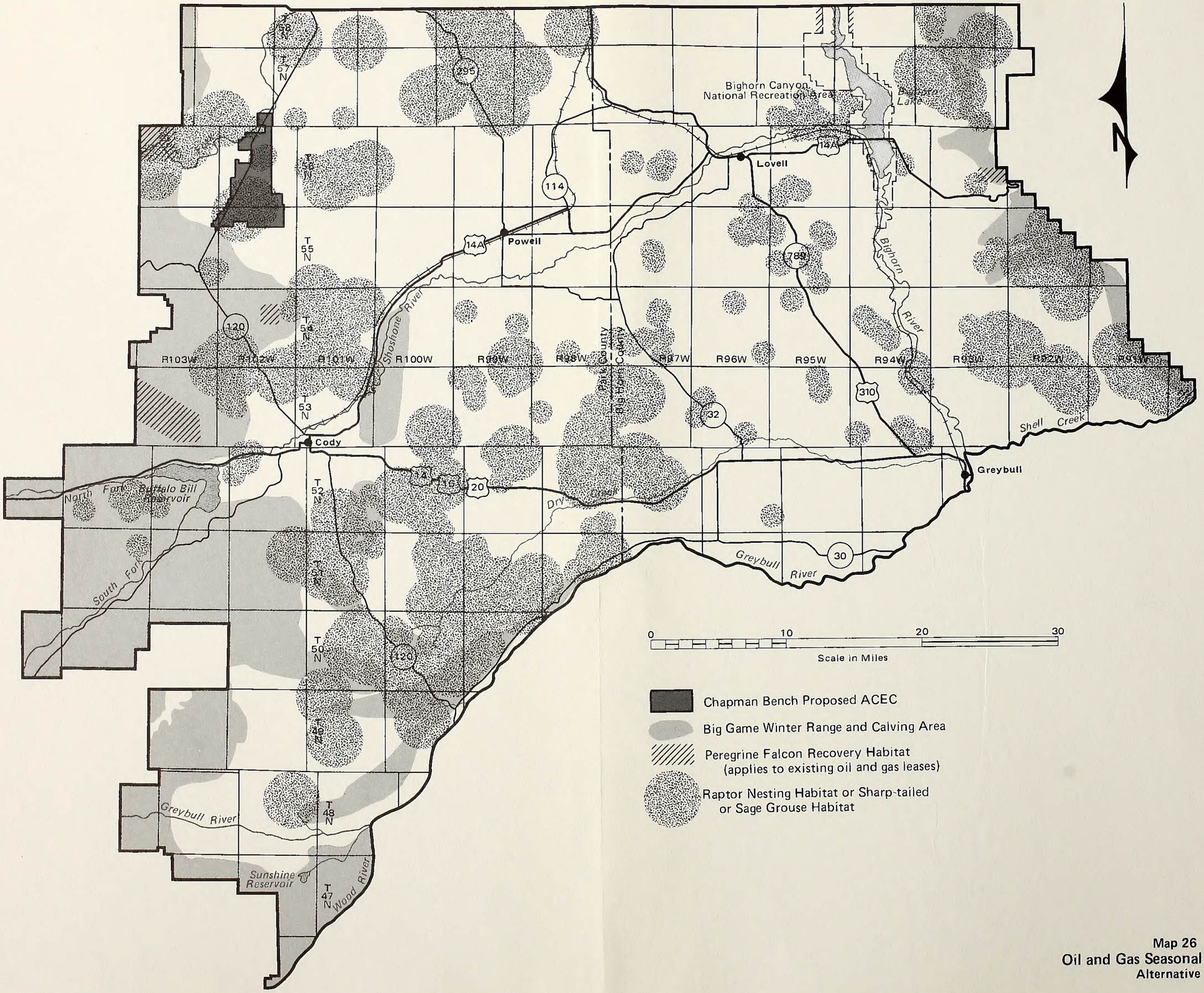
No Surface Occupancy

1. Known Caves
2. Game and Fish Access Areas
3. Shooting Club
4. Five Springs Falls Proposed ACEC
5. Bighorn River HMP/RAMP

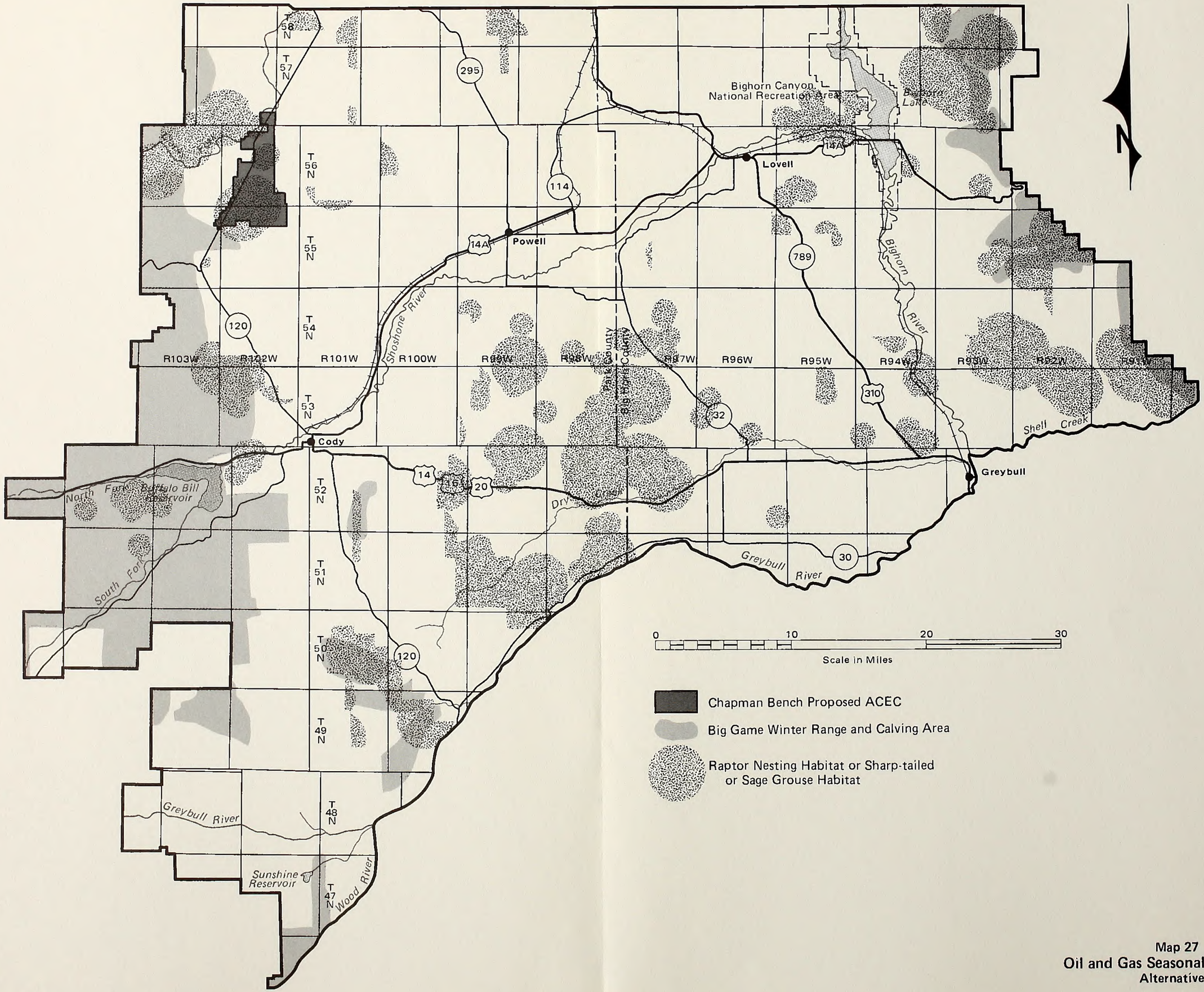
No Surface Use or Activity

- Prairie Dog Colony
- Black–Footed Ferret Essential Habitat
- Bald Eagle Nesting Habitat
- Sage Grouse Lek
- Peregrine Falcon Recovery Habitat (applies to new oil and gas leases)

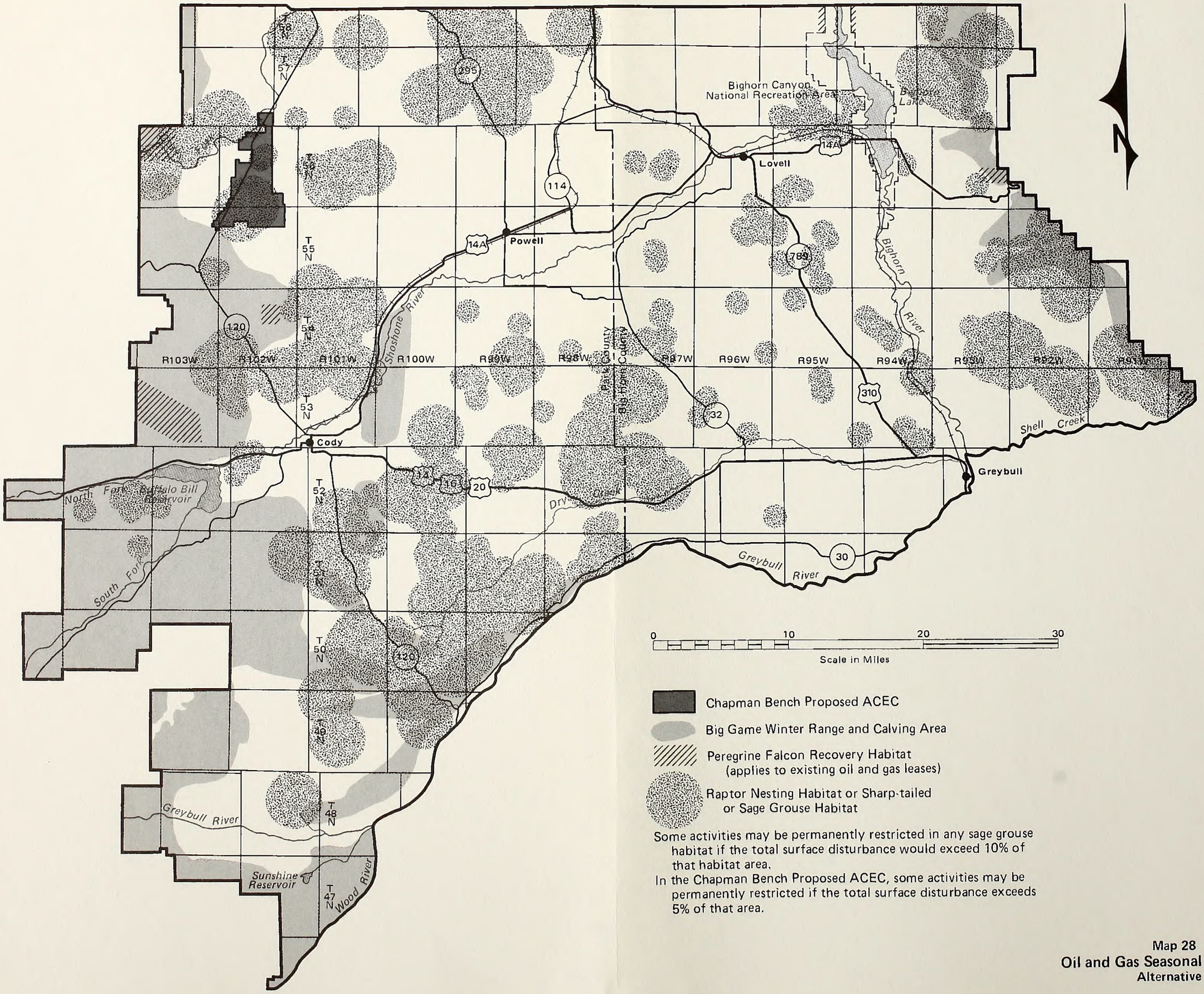
Map 25
Oil and Gas Fulltime Restrictions
Alternative D



Map 26
Oil and Gas Seasonal Restrictions
Alternative A



Map 27
Oil and Gas Seasonal Restrictions
Alternative B



Chapman Bench Proposed ACEC

Big Game Winter Range and Calving Area

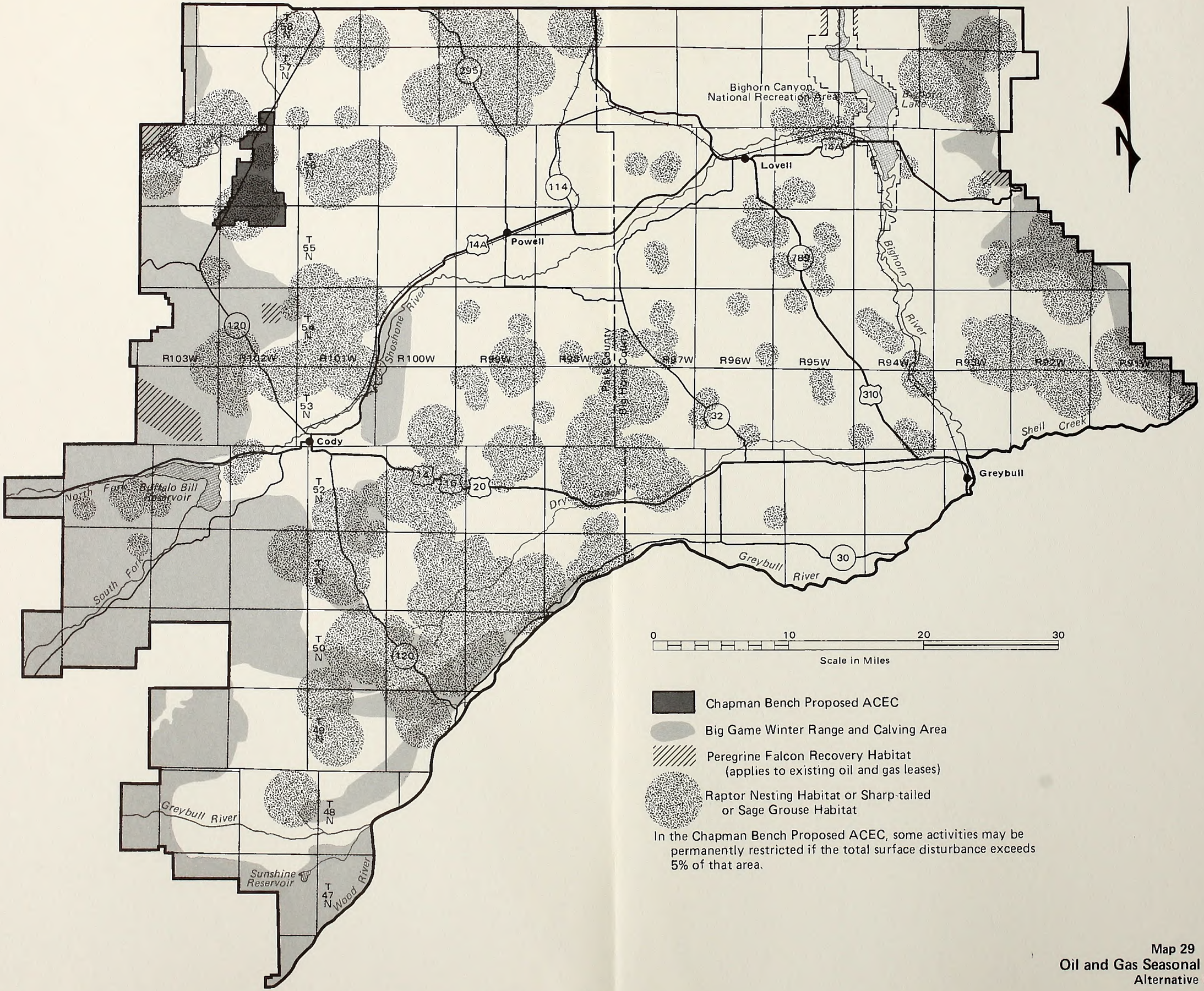
Peregrine Falcon Recovery Habitat
(applies to existing oil and gas leases)

Raptor Nesting Habitat or Sharp-tailed
or Sage Grouse Habitat

Some activities may be permanently restricted in any sage grouse habitat if the total surface disturbance would exceed 10% of that habitat area.

In the Chapman Bench Proposed ACEC, some activities may be permanently restricted if the total surface disturbance exceeds 5% of that area.

Map 28
Oil and Gas Seasonal Restrictions
Alternative C



In the Chapman Bench Proposed ACEC, some activities may be permanently restricted if the total surface disturbance exceeds 5% of that area.

Map 29
Oil and Gas Seasonal Restrictions
Alternative D

TABLE 4

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Carter Mountain Proposed ACEC	Objective: To protect areas of unique alpine tundra and fragile soils.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Designation: An ACEC would be designated on about 7,819 acres (see map 31).	Designation: Same as Alternative A	Designation: Same as Alternative A	Designation: Same as Alternative A
	Restrictions on Surface-Disturbing Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities
	The Carter Mountain proposed ACEC would be open to oil and gas exploration and development.	Same as Alternative A	The Carter Mountain proposed ACEC would be closed to oil and gas exploration and development.	Same as Alternative A
	For the protection of fragile soils and alpine tundra, surface-disturbing activities for oil and gas exploration and development would be prohibited on slopes of more than 7%.	Surface-disturbing activities for oil and gas exploration and development would be allowed on slopes of up to 25%.	Oil and gas exploration and development would be prohibited throughout the proposed ACEC.	Same as Alternative A
	Other surface-disturbing activities such as geophysical exploration and right-of-way construction would be prohibited on slopes of more than 7%.	Other surface-disturbing activities would be allowed on slopes up to 25%.	Same as Alternative A except that geophysical exploration would be prohibited throughout the proposed ACEC.	Same as Alternative A
	For the protection of crucial winter range for mule deer and bighorn sheep, seasonal restrictions would be applied to surface-disturbing activities and land uses such as exploration and development for leasable and salable minerals, geophysical exploration,	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	recreation, and construction activities (including development of range projects).			
	Cultural Resource Management Class III cultural resource inventories would be conducted before surface-disturbing activities could be authorized. Effects on cultural resources would be mitigated or avoided.	**Cultural Resource** Management Same as Alternative A	**Cultural Resource** Management Same as Alternative A	**Cultural Resource** Management Same as Alternative A
	Fire Management The proposed ACEC would be managed as a full suppression area for wildfire, although the use of heavy equipment would be restricted to protect fragile soils and alpine tundra. Prescribed fire would be used as appropriate to accomplish management objectives described in resource activity plans such as HMPs and AMPs.	**Fire Management** Same as Alternative A	**Fire Management** Same as Alternative A	**Fire Management** Same as Alternative A
	Hazardous Materials and Wastes Hazardous Wastes: The BLM would require that sites contaminated with hazardous wastes be reported and that responsible parties clean them up and	**Hazardous Materials and** Wastes Hazardous Wastes: Same as Alternative A	**Hazardous Materials and** Wastes Hazardous Wastes: Same as Alternative A	**Hazardous Materials and** Wastes Hazardous Wastes: Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	compensate for damages according to federal and state regulations and BLM-approved plans.			
	Hazardous Materials: For activities on public lands that use hazardous materials, the BLM would monitor precautionary measures to guard against leakage into the environment.	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A
	Other Hazards: If any hazards should be identified, the BLM would provide warnings and establish precautions regarding safety hazards associated with the use of any areas on public land.	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A
	Lands and Realty—Access Existing public access opportunities through the proposed ACEC would be maintained, but additional access would not be sought.	**Lands and Realty—Access** Same as Alternative A	**Lands and Realty—Access** Public access through the proposed ACEC would be closed.	**Lands and Realty—Access** Same as Alternative A
	Lands and Realty—Landownership Adjustments No attempts would be made to acquire nonfederal lands in the area.	**Lands and Realty—Landownership** Adjustments About 840 acres would be identified for possible acquisition to improve management through consolidation of landownership.	**Lands and Realty—Landownership** Adjustments About 3,000 acres would be identified for possible acquisition to improve the management through consolidation of landownership. This would enable the BLM to administer all of the proposed ACEC area above an elevation of 10,000 feet.	**Lands and Realty—Landownership** Adjustments Same as Alternative B

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Lands and Realty—Utility Transportation Systems The proposed ACEC would not be designated an avoidance area for rights-of-way.	**Lands and Realty—Utility** Transportation Systems Same as Alternative A	**Lands and Realty—Utility** Transportation Systems The Carter Mountain proposed ACEC would be designated an avoidance area for placement of future rights-of-way. When rights-of-way would be required or the proposed ACEC could not reasonably be avoided, the effects of right-of-way construction on soils, watershed, and alpine tundra would be intensively mitigated.	**Lands and Realty—Utility** Transportation Systems Same as Alternative C
	Livestock Grazing Management Livestock grazing would continue on three allotments in the proposed ACEC.	**Livestock Grazing** Management Same as Alternative A	**Livestock Grazing** Management Same as Alternative A	**Livestock Grazing** Management Same as Alternative A
	Minerals Management The proposed ACEC would be open to locatable mineral entry. A plan of operations would be required for all locatable mineral exploration and development (except casual use), including disturbances that would cover 5 acres or less.	**Minerals Management** Same as Alternative A	**Minerals Management** The proposed ACEC would be closed to locatable mineral exploration and development. For existing mining claims, a plan of operations would be required for mineral exploration and development (except casual use), including disturbances that would cover 5 acres or less.	**Minerals Management** Same as Alternative A
	Off-Road Vehicle Management The proposed ACEC would be open to ORV use.	**Off-Road Vehicle** Management ORV use in the proposed ACEC would be restricted	**Off-Road Vehicle** Management The proposed ACEC would be closed to ORV use.	**Off-Road Vehicle** Management ORV use in the proposed ACEC would be restricted

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
		to existing roads and trails.		to designated roads and trails.
	Recreation Management Recreational sites would not be developed, and interpretive signs would not be installed.	**Recreation Management** One or more semideveloped recreational sites would be provided. Directional and interpretive signs would be installed.	**Recreation Management** Recreational sites would not be developed. A few interpretive signs would be installed.	**Recreation Management** Same as Alternative A
	Visual Resource Management Visual resources would be managed in accordance with Class II VRM objectives (see appendix H).	**Visual Resource** Management Same as Alternative A	**Visual Resource** Management Visual resources in the proposed ACEC would be managed in accordance with Class I VRM objectives.	**Visual Resource** Management Same as Alternative A
	Wildlife and Fish Habitat Management On big game winter range in the proposed ACEC, snow removal from roads would be allowed without prior approval or limitation to provide vehicle access for maintenance and operation of existing leases and permits.	**Wildlife and Fish Habitat** Management Same as Alternative A	**Wildlife and Fish Habitat** Management During periods of severe winter weather (average of about two years out of ten), approval of the BLM would be required before snow could be removed to gain access to leases and permits in big game winter ranges. The purpose would be to minimize unnecessary human disturbance during periods that wildlife are under stress.	**Wildlife and Fish Habitat** Management Same as Alternative C
Chapman Bench Proposed ACEC	Objective: To protect an important long-billed curlew and mountain plover nesting concentration area and adjacent habitat along Sand Coulee.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Designation: An ACEC would be designated on about	Designation: An ACEC would be designated on about	Designation: Same as Alternative A	Designation: Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	15,400 acres of Chapman Bench (see map 32).	7,700 acres of Chapman Bench comprising a nesting concentration area for long-billed curlews and mountain plovers.		
	Restrictions on Surface-Disturbing Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities
	The proposed ACEC would be open to oil and gas exploration and development.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Surface-disturbing activities and land uses would not be limited by seasonal or fulltime restrictions.	Same as Alternative A	Surface-disturbing activities would be allowed from October 1 to April 15. However, no surface-disturbing activities would be allowed if unreclaimed disturbance would exceed 5% of the total surface of the proposed ACEC at any given time. These restrictions generally would be applied to such things as leasable minerals exploration and development, geophysical exploration (except casual use), and construction activities, including right-of-way development.	Same as Alternative C
	Cultural Resource Management	**Cultural Resource** Management	**Cultural Resource** Management	**Cultural Resource** Management
	Class III cultural resource inventories would be conducted before surface-disturbing activities could be authorized. Effects on cultural resources would be mitigated or avoided.	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Fire Management	**Fire Management**	**Fire Management**	Fire Management
	The proposed ACEC would be identified as a full suppression area for wildfire. Prescribed fire would be used as appropriate to accomplish management objectives described in resource activity plans such as HMPs and AMPs.	The proposed ACEC would be a limited suppression area for wildfire. Prescribed fire would be used as appropriate to accomplish management objectives described in resource activity plans such as HMPs and AMPs.	Same as Alternative B	Same as Alternative B
	Hazardous Materials and Wastes	**Hazardous Materials and** Wastes	**Hazardous Materials and** Wastes	**Hazardous Materials and** Wastes
	Hazardous Wastes: The BLM would require that sites contaminated with hazardous wastes be reported and that responsible parties clean them up and compensate for damages according to federal and state regulations and BLM-approved plans.	Hazardous Wastes: Same as Alternative A	Hazardous Wastes: Same as Alternative A	Hazardous Wastes: Same as Alternative A
	Hazardous Materials: For activities on public lands that use hazardous materials, the BLM would monitor precautionary measures to guard against leakage into the environment.	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A
	Other Hazards: If any hazards should be identified, the BLM would provide warnings and establish precautions regarding safety hazards associated with the use of any areas on public land.	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Lands and Realty—Landownership Adjustments No lands in the proposed ACEC would be identified for acquisition.	**Lands and Realty—** Landownership Adjustments Same as Alternative A	**Lands and Realty—** Landownership Adjustments Same as Alternative A	**Lands and Realty—** Landownership Adjustments Same as Alternative A
	Lands and Realty—Utility/ Transportation Systems The proposed ACEC would not be designated an avoidance area for rights-of-way.	**Lands and Realty—Utility/** Transportation Systems Same as Alternative A	**Lands and Realty—Utility/** Transportation Systems The proposed ACEC would be designated an avoidance area for placement of aboveground power lines and road rights-of-way. When rights-of-way would be required or the proposed ACEC could not reasonably be avoided, the effects of right-of-way construction would be intensively mitigated.	**Lands and Realty—Utility/** Transportation Systems Same as Alternative C
	Livestock Grazing Management Livestock grazing management in the proposed ACEC would be consistent with management objectives in one existing AMP in the area: to improve vegetative condition and increase vegetation height and ground cover.	**Livestock Grazing** Management Livestock grazing management in the proposed ACEC would be consistent with ACEC objectives. Before the nesting season for long-billed curlews and mountain plovers, livestock grazing would be managed to reduce the height of vegetation. Sheep grazing would be prohibited during the nesting season. Habitat requirements for curlews and plovers would be incorporated into AMPs and other activity plans that would be developed for the area.	**Livestock Grazing** Management Same as Alternative B	**Livestock Grazing** Management Same as Alternative B

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Minerals Management	**Minerals Management**	**Minerals Management**	**Minerals Management**
	The area would be closed to locatable mineral exploration and development.	The area would be open to locatable mineral exploration and development.	Same as Alternative A	Same as Alternative A
	For existing mining claims, a plan of operations would be required for all mineral exploration and development (except casual use), including disturbances that would cover 5 acres or less.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Off-Road Vehicle Management	**Off-Road Vehicle** Management	**Off-Road Vehicle** Management	**Off-Road Vehicle** Management
	The proposed ACEC would be open to ORV use.	ORV use in the proposed ACEC would be restricted to existing roads and trails.	ORV use in the proposed ACEC would be restricted to designated roads and trails.	Same as Alternative C
	Visual Resource Management	**Visual Resource** Mangement	**Visual Resource** Management	**Visual Resource** Management
	Visual resources would be managed in accordance with Class II and III VRM objectives (as shown on map 16).	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Wildlife and Fish Habitat Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management
	The BLM would attempt to establish suitable riparian foraging habitat on Chapman Bench along Little Sand Coulee or to develop other riparian habitat and water sources for wildlife.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The use of chemical treatments to control insects in the proposed ACEC would be allowed, as appropriate.	The use of chemical treatments to control insects would be prohibited.	Same as Alternative B	Same as Alternative B

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Five Springs Falls Proposed ACEC	Objective: To protect existing populations of four near-endemic rare and sensitive plant species in the Five Springs Falls area.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Designation: Natural values in the area would be managed under current laws and regulations without an ACEC designation.	Designation: Same as Alternative A	Designation: An ACEC comprising about 160 acres would be designated in the Five Springs Falls area (see map 33).	Designation: Same as Alternative C
	Restrictions on Surface-Disturbing Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities
	The Five Springs area would be open to oil and gas exploration and development.	Same as Alternative A	The proposed ACEC (about 160 acres) would be closed to oil and gas exploration and development.	Same as Alternative A
	A "no surface occupancy" restriction would be applied to oil and gas exploration and development on about 640 acres comprising the Five Springs Falls Campground and vicinity.	Same as Alternative A	Oil and gas exploration and development would be prohibited on about 160 acres comprising the proposed ACEC.	Same as Alternative A except that the area affected by "no surface occupancy" would be reduced to cover the 160-acre proposed ACEC.
	The 640-acre Five Springs Falls area generally would be closed to surface-disturbing activities such as geophysical exploration, salable minerals exploration and development, and construction activities (except those related to development of recreation or interpretation of rare plants).	Same as Alternative A	Same as Alternative A except that the closed area would be reduced to cover only the 160-acre proposed ACEC.	Same as Alternative C

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Cultural Resource Management Class III cultural resource inventories would be conducted before surface-disturbing activities could be authorized. Effects on cultural resources would be mitigated or avoided.	**Cultural Resource** Management Same as Alternative A	**Cultural Resource** Management Same as Alternative A	**Cultural Resource** Management Same as Alternative A
	Fire Management The Five Springs Falls area would be a full suppression area for wildfire. Prescribed fire would be used as appropriate to accomplish management objectives described in resource activity plans such as HMPs and AMPs.	**Fire Management** Same as Alternative A	**Fire Management** Same as Alternative A	**Fire Management** Same as Alternative A
	Forest Management Forest resources in the Five Springs Falls area would be managed to emphasize native plant, wildlife, watershed, and recreation values.	**Forest Management** Same as Alternative A	**Forest Management** Same as Alternative A	**Forest Management** Same as Alternative A
	Hazardous Materials and Wastes Hazardous Wastes: The BLM would require that sites contaminated with hazardous wastes be reported and that responsible parties clean them up and compensate for damages according to federal and state regulations and BLM-approved plans.	**Hazardous Materials and** Wastes Hazardous Wastes: Same as Alternative A	**Hazardous Materials and** Wastes Hazardous Wastes: Same as Alternative A	**Hazardous Materials and** Wastes Hazardous Wastes: Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Hazardous Materials: For activities on public lands that use hazardous materials, the BLM would monitor precautionary measures to guard against leakage into the environment.	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A
	Other Hazards: If any hazards should be identified, the BLM would provide warnings and establish precautions regarding safety hazards associated with the use of any areas on public land.	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A
	Lands and Realty—Access	**Lands and Realty—Access**	**Lands and Realty—Access**	**Lands and Realty—Access**
	Existing access would be retained in the Five Springs Falls area. Additional access would not be acquired.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Lands and Realty—Utility/ Transportation Systems	**Lands and Realty—Utility/** Transportation Systems	**Lands and Realty—Utility/** Transportation Systems	**Lands and Realty—Utility/** Transportation Systems
	The Five Springs Falls area would be open for the placement of future rights-of-way.	Same as Alternative A	The proposed ACEC would be designated an avoidance area for placement of future rights-of-way. When rights-of-way would be required or the proposed ACEC could not reasonably be avoided, the effects of right-of-way construction would be intensively mitigated.	Same as Alternative C
	Livestock Grazing Management	**Livestock Grazing** Management	**Livestock Grazing** Management	**Livestock Grazing** Management
	Livestock grazing would	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	continue to occur occasionally in the area, although grazing would be excluded from the Five Springs Falls Campground.			
	Minerals Management	**Minerals Management**	**Minerals Management**	**Minerals Management**
	The area would be closed to locatable mineral exploration and development by segregations contained in a C&MU classification (on about 7,000 acres) for the Five Springs Falls area.	The Five Springs Falls area would be open to locatable mineral exploration and development.	Same as Alternative A except that the area closed would be reduced to cover only the 160-acre proposed ACEC.	Same as Alternative C
	For existing mining claims, a plan of operations would be required for all locatable mineral exploration and development (except casual use), for disturbances that would cover more than 5 acres.	Same as Alternative A	For existing mining claims, a plan of operations would be required for all locatable mineral exploration and development (except casual use), including disturbances that would cover 5 acres or less.	Same as Alternative C
	Off-Road Vehicle Management	**Off-Road Vehicle** Management	**Off-Road Vehicle** Management	**Off-Road Vehicle** Management
	The Five Springs Falls area would be open to ORV use.	ORV use in the Five Springs Falls area would be restricted to existing roads and trails.	The proposed ACEC would be closed to ORV use.	Same as Alternative C
	Recreation Management	**Recreation Management**	**Recreation Management**	**Recreation Management**
	Recreational facilities at the Five Springs Falls Campground would be maintained. Interpretive signs would not be installed in the area.	Same as Alternative A	Recreational facilities at the Five Springs Falls Campground would be maintained. Interpretive signs would be used in the proposed ACEC to explain the importance of protecting rare plants and their habitat.	Same as Alternative C

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Hiking and climbing in the area would not be restricted.	Same as Alternative A	To protect rare plants, hiking would be limited to existing trails, and except for the purposes of approved monitoring and research, no climbing would be allowed on the cliff that forms Five Springs Falls.	Same as Alternative C
	Visual Resource Management	**Visual Resource** Management	**Visual Resource** Management	**Visual Resource** Management
	Visual resources in the area would be managed in accordance with Class II VRM objectives.	Same as Alternative A	Visual resources in the ACEC would be managed in accordance with Class I VRM objectives.	Same as Alternative C
	Wildlife and Fish Habitat Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management
	Wildlife habitat management in the Five Springs Falls area would be consistent with objectives of the West Slope HMP. Protection of crucial winter range for mule deer would be emphasized.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Little Mountain Proposed ACEC	Objective: To protect and manage important cave resources and important cultural and paleontological values.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Designation: An ACEC comprising about 20,510 acres would be designated in the Little Mountain area (see map 34).	Designation: Same as Alternative A	Designation: Same as Alternative A	Designation: Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Restrictions on Surface-Disturbing Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions and Surface-Disturbing** Activities
	A "no surface occupancy" restriction for leasable minerals exploration and development would be applied to about 528 acres above Natural Trap and Horsethief caves. If important caves or cave passages were discovered in the future, they would be protected in the same way.	Same as Alternative A	A "no surface occupancy" restriction would be applied to leasable minerals exploration and development on all 20,510 acres in the proposed ACEC.	Same as Alternative A
	Other surface-disturbing activities would be prohibited above Natural Trap and Horsethief caves and on lands above any important newly discovered cave passage. These prohibited activities generally would include such things as geophysical exploration, salable minerals exploration and development, and construction of roads and reservoirs.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Cultural Resource Management	**Cultural Resource** Management	**Cultural Resource** Management	**Cultural Resource** Management
	An activity plan would not be developed to address cultural and paleontological resources on Little Mountain.	Same as Alternative A	A cultural resource management plan would be developed to address management of significant cultural and paleontological resources in the proposed ACEC.	Same as Alternative C

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions In Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Class III cultural resource inventories would be conducted before surface-disturbing activities could be authorized and before use of prescribed fire. Effects on cultural resources would be mitigated or avoided.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Fire Management	**Fire Management**	**Fire Management**	**Fire Management**
	The proposed ACEC would be identified as a full suppression area for wildfire, but heavy equipment would be prohibited over Horsethief, Natural Trap, and other important caves.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Hazardous Materials and Wastes	**Hazardous Materials and** Wastes	**Hazardous Materials and** Wastes	**Hazardous Materials and** Wastes
	Hazardous Wastes: The BLM would require that sites contaminated with hazardous wastes be reported and that responsible parties clean them up and compensate for damages according to federal and state regulations and BLM-approved plans.	Hazardous Wastes: Same as Alternative A	Hazardous Wastes: Same as Alternative A	Hazardous Wastes: Same as Alternative A
	Hazardous Materials: For activities on public lands that use hazardous materials, the BLM would monitor precautionary measures to guard against leakage into the environment.	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Other Hazards: If any hazards should be identified, the BLM would provide warnings and establish precautions regarding safety hazards associated with the use of any areas on public land.	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A
	Lands and Realty—Utility/ Transportation Systems	**Lands and Realty—Utility/** Transportation Systems	**Lands and Realty—Utility/** Transportation Systems	**Lands and Realty—Utility/** Transportation Systems
	The area would be open for the placement of future rights-of-way.	Same as Alternative A	The Little Mountain proposed ACEC would be designated an avoidance area for placement of future rights-of-way. When rights-of-way would be required or the proposed ACEC could not reasonably be avoided, the effects of right-of-way construction would be intensively mitigated.	Same as Alternative C
	Livestock Grazing Management	**Livestock Grazing** Management	**Livestock Grazing** Management	**Livestock Grazing** Management
	Livestock grazing would continue on three grazing allotments that are inside the proposed ACEC.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Minerals Management	**Minerals Management**	**Minerals Management**	**Minerals Management**
	About 528 acres over Horsethief and Natural Trap caves would remain closed to locatable mineral exploration and development.	Same as Alternative A	All lands in the proposed ACEC would be closed to locatable mineral exploration and development.	About 528 acres over Horsethief and Natural Trap caves would remain closed to locatable mineral exploration and development. In addition, closures would be established for lands above other significant caves and above newly

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
				discovered caves and cave passages as these caves are discovered.
	For existing mining claims on the 528 acres, a plan of operations would be required for all locatable mineral exploration and development (except casual use), including disturbances that would cover 5 acres or less.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	In the remainder of the proposed ACEC, a plan of operations would be required for locatable mineral exploration and development (except casual use) on existing and future mining claims, including disturbances that would cover 5 acres or less.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Off-Road Vehicle Management	**Off-Road Vehicle** Management	**Off-Road Vehicle** Management	**Off-Road Vehicle** Management
	The proposed ACEC would be open to ORV use.	ORV use in the proposed ACEC would be restricted to existing roads and trails.	ORV use in the proposed ACEC would be restricted to designated roads and trails.	Same as Alternative C
	Recreation Management	**Recreation Management**	**Recreation Management**	**Recreation Management**
	No recreational facilities would be constructed.	Facilities for cavers would be constructed near Horsethief cave. Visitor services and patrols would be increased, and interpretive and directional signs would be posted.	Same as Alternative B	Same as Alternative B
	The issuance of cave permits would be limited to	Same as Alternative A	The issuance of cave permits would be limited to	Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	ensure a "wild" experience for cave users.		ensure a "wild" experience for cave users; however, the use of some caves or cave portions with significant cultural or paleontological resources would be allowed only for scientific study.	
	Visual Resource Management	**Visual Resource** Management	**Visual Resource** Management	**Visual Resource** Management
	Visual resources would be managed in accordance with Class II and Class III VRM objectives according to the classifications shown on map 16.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Wildlife and Fish Habitat Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management
	Wildlife habitat management would be consistent with objectives contained in the West Slope HMP and would emphasize protection of crucial winter range for mule deer.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Sheep Mountain Anticline Proposed ACEC	Objective: To protect an important natural area with unique geological features.	Objective: Same as Alternative A	Objective: Same as Alternative A	Objective: Same as Alternative A
	Designation: The area would not be designated an ACEC.	Designation: Same as Alternative A	Designation: The Sheep Mountain Anticline ACEC would be designated on about 17,849 acres (see map 35).	Designation: Same as Alternative C
	Restrictions on Surface-Disturbing Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities	**Restrictions on Surface-Disturbing** Activities
	All lands in the Sheep Mountain Anticline area	Same as Alternative A	Bighorn River HMP/RAMP tracts in the proposed ACEC	Same as Alternative A except that a "no surface

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	would be open to oil and gas exploration and development, including Bighorn River HMP/RAMP tracts.		(about 790 acres) would be closed to oil and gas exploration and development. The remainder of the proposed ACEC would be open to oil and gas exploration and development.	occupancy" restriction would be applied to oil and gas exploration and development in Bighorn River HMP/RAMP tracts (about 790 acres).
	Surface-disturbing activities would be allowed in the Sheep Mountain Anticline area.	Same as Alternative A	Bighorn River HMP/RAMP tracts in the proposed ACEC generally would be closed to surface-disturbing activities such as geophysical exploration, salable minerals exploration and development, and construction activities (except those related to development of recreation or wildlife habitat). Elsewhere in the proposed ACEC, surface-disturbing activities generally would be allowed.	Same as Alternative C
	Cultural Resource Management	**Cultural Resource** Management	**Cultural Resource** Management	**Cultural Resource** Management
	Class III cultural resource inventories would be conducted before surface-disturbing activities could be authorized. Effects on cultural resources would be mitigated or avoided.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Fire Management	**Fire Management**	**Fire Management**	**Fire Management**
	The Sheep Mountain area would be a full suppression area for wildfire. Prescribed fire would be	The Sheep Mountain area would be identified as a limited suppression area for wildfire.	The proposed ACEC would be identified as a limited suppression area for wildfire.	Same as Alternative C

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	used as appropriate to accomplish management objectives described in resource activity plans such as HMPs and AMPs.			
	Hazardous Materials and Wastes	**Hazardous Materials and** Wastes	**Hazardous Materials and** Wastes	**Hazardous Materials and** Wastes
	Hazardous Wastes: The BLM would require that sites contaminated with hazardous materials be reported and that responsible parties clean them up and compensate for damages according to federal and state regulations and BLM-approved plans.	Hazardous Wastes: Same as Alternative A	Hazardous Wastes: Same as Alternative A	Hazardous Wastes: Same as Alternative A
	Hazardous Materials: For activities on public lands that use hazardous materials, the BLM would monitor precautionary measures to guard against leakage into the environment.	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A	Hazardous Materials: Same as Alternative A
	Other Hazards: If any hazards should be identified, the BLM would provide warnings and establish precautions regarding safety hazards associated with the use of any areas on public land.	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A	Other Hazards: Same as Alternative A
	Lands and Realty—Landownership Adjustments	**Lands and Realty—** Landownership Adjustments	**Lands and Realty—** Landownership Adjustments	**Lands and Realty—** Landownership Adjustments
	No lands in the Sheep Mountain Anticline area	Same as Alternative A	About 1,680 acres of nonfederal land in the	Same as Alternative A

TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions In Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	would be identified for acquisition.		Sheep Mountain Anticline area would be identified for acquisition.	
	Lands and Realty—Utility/ Transportation Systems	**Lands and Realty—Utility/** Transportation Systems	**Lands and Realty—Utility/** Transportation Systems	**Lands and Realty—Utility/** Transportation Systems
	The Sheep Mountain Anticline area would remain open to future placement of rights-of-way.	Same as Alternative A	The Bighorn River HMP/RAMP tracts in the Sheep Mountain Anticline proposed ACEC would be designated an avoidance area for placement of new rights-of-way. When rights-of-way would be required or these tracts could not reasonably be avoided, the effects of right-of-way construction would be intensively mitigated. The remainder of the area would not be designated an avoidance area.	Same as Alternative C
	Livestock Grazing Management	**Livestock Grazing** Management	**Livestock Grazing** Management	**Livestock Grazing** Management
	Livestock grazing would continue on four allotments in the Sheep Mountain Anticline area.	Same as Alternative A	Livestock grazing would continue on four allotments in the proposed ACEC.	Same as Alternative C
	Minerals Management	**Minerals Management**	**Minerals Management**	**Minerals Management**
	The Bighorn River HMP/RAMP tracts in the Sheep Mountain Anticline area would remain open to locatable mineral exploration and development.	Same as Alternative A	The Bighorn River HMP/RAMP tracts in the Sheep Mountain Anticline ACEC would be closed to further locatable mineral entry.	Same as Alternative C

TABLE 4 (Continued)

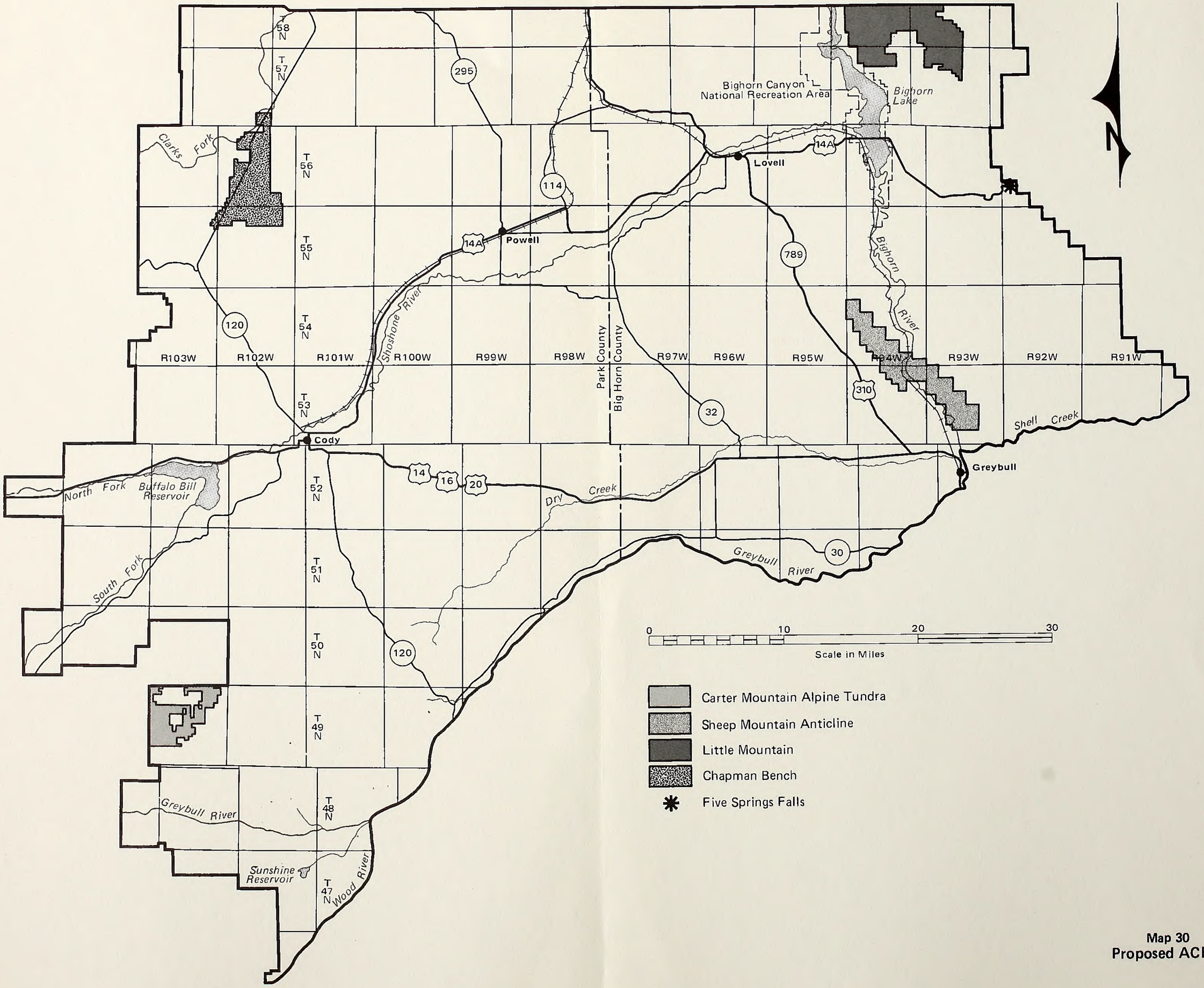
MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

Management Actions In Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Lands within the Sheep Mountain Anticline area would be open to mineral exploration and development.	Same as Alternative A	Generally, lands within the proposed ACEC would be closed to locatable mineral exploration and development subject to valid existing rights. The closure would not include lands with potential for the development of gypsum or bentonite.	Same as Alternative C
	A plan of operations would be required for locatable mineral exploration and development (except casual use) for disturbances that would cover more than 5 acres.	Same as Alternative A	A plan of operations would be required for locatable mineral exploration and development (except casual use), including disturbances that would cover 5 acres or less.	Same as Alternative C
	Off-Road Vehicle Management The Sheep Mountain Anticline area would remain open to ORV use.	**Off-Road Vehicle** Management ORV use in the Sheep Mountain Anticline area would be restricted to existing roads and trails.	**Off-Road Vehicle** Management ORV use in the Sheep Mountain Anticline proposed ACEC would be restricted to designated roads and trails.	**Off-Road Vehicle** Management Same as Alternative C
	Recreation Management No signs, roads, or recreational facilities would be developed for the Sheep Mountain Anticline area.	**Recreation Management** The Sheep Mountain Anticline area would be intensively managed for recreational and interpretive use. Signs, roads, and recreational facilities would be developed.	**Recreation Management** The ACEC would be managed in a limited manner for recreational use. Interpretive signs would be installed.	**Recreation Management** Same as Alternative B
	Visual Resource Management Visual resources in the Sheep Mountain Anticline	**Visual Resource** Management Same as Alternative A	**Visual Resource** Management Visual resource in the Sheep Mountain Anticline	**Visual Resource** Management Same as Alternative A

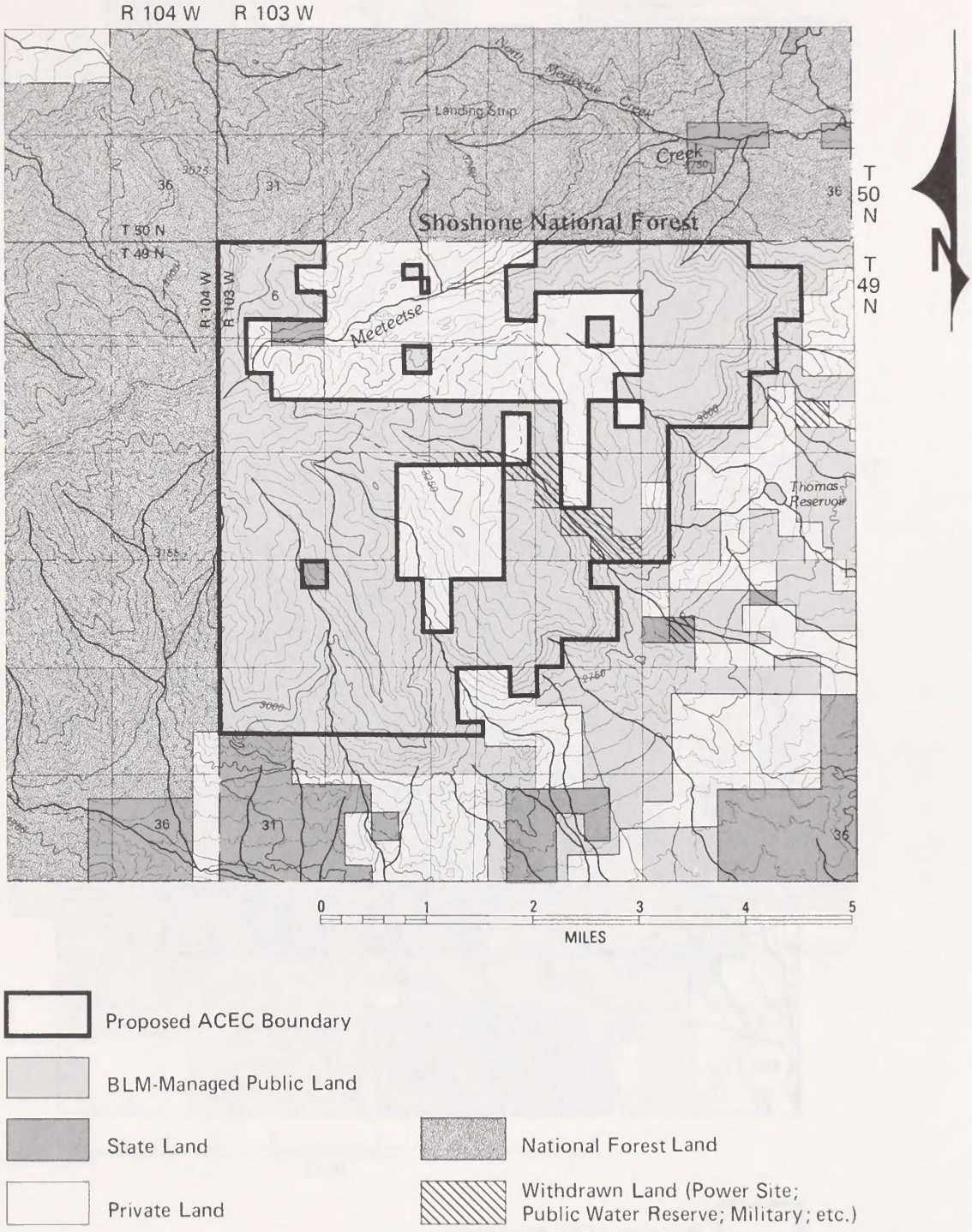
TABLE 4 (Continued)

MANAGEMENT ACTIONS IN PROPOSED ACECs UNDER EACH ALTERNATIVE

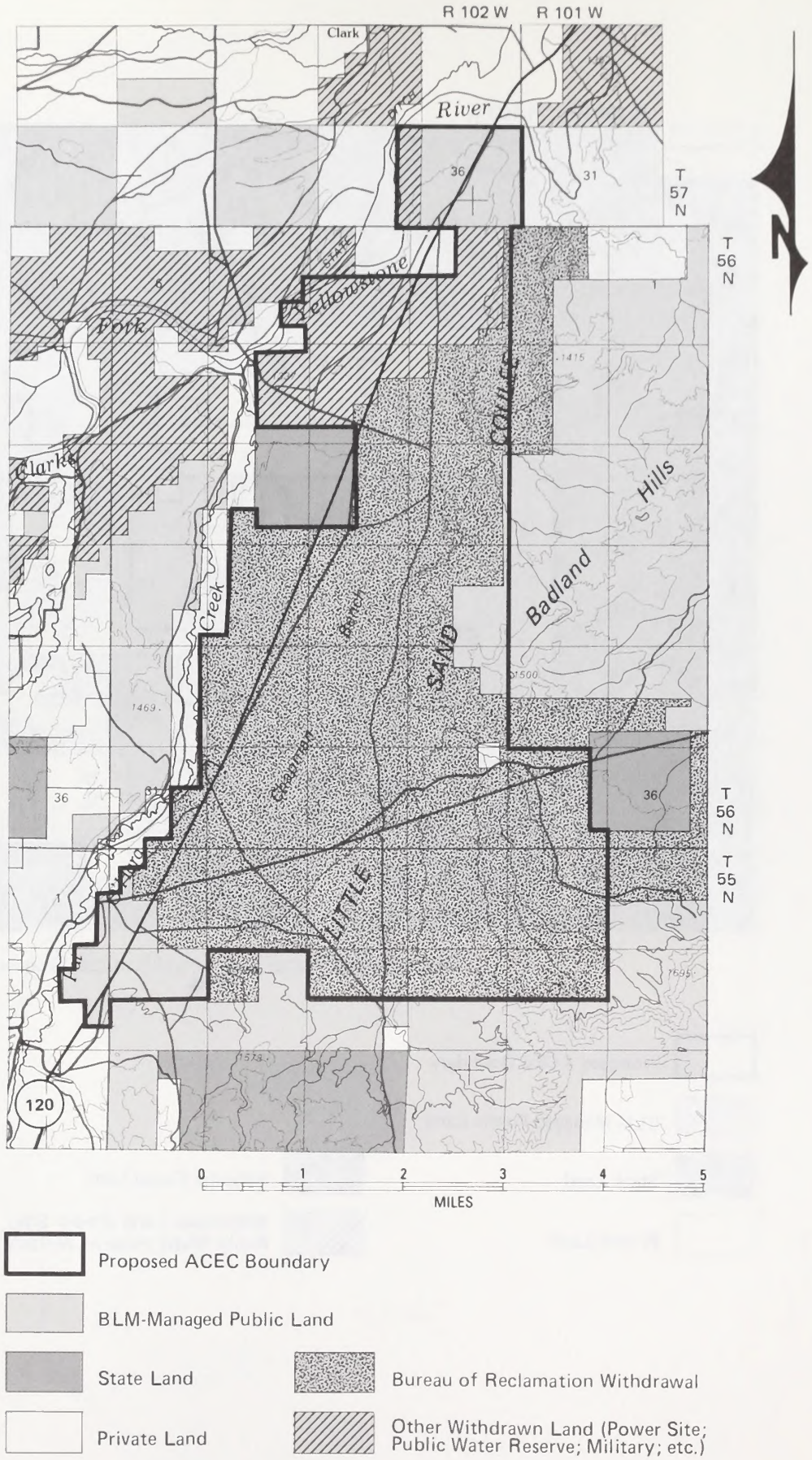
Management Actions in Proposed ACECs by Resource Program (see map 30)	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	area would be managed in accordance with Class II VRM objectives.		ACEC would be managed in accordance with Class I VRM objectives.	
	Wildlife and Fish Habitat Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management	**Wildlife and Fish Habitat** Management
	Wildlife habitat management in the Sheep Mountain Anticline area would be consistent with existing fish and wildlife habitat management plans.	Same as Alternative A	Same as Alternative A	Same as Alternative A



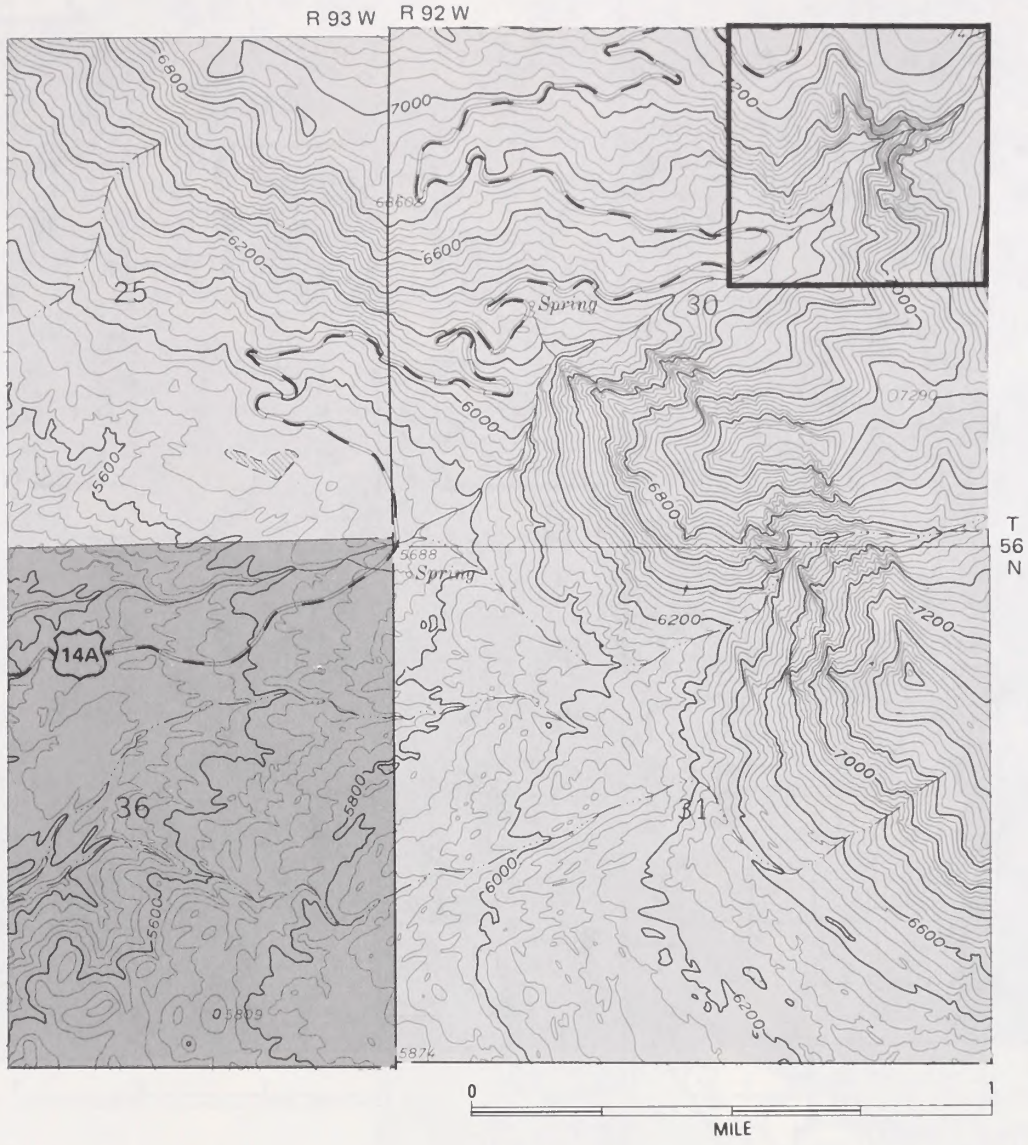
Map 30
Proposed ACECs



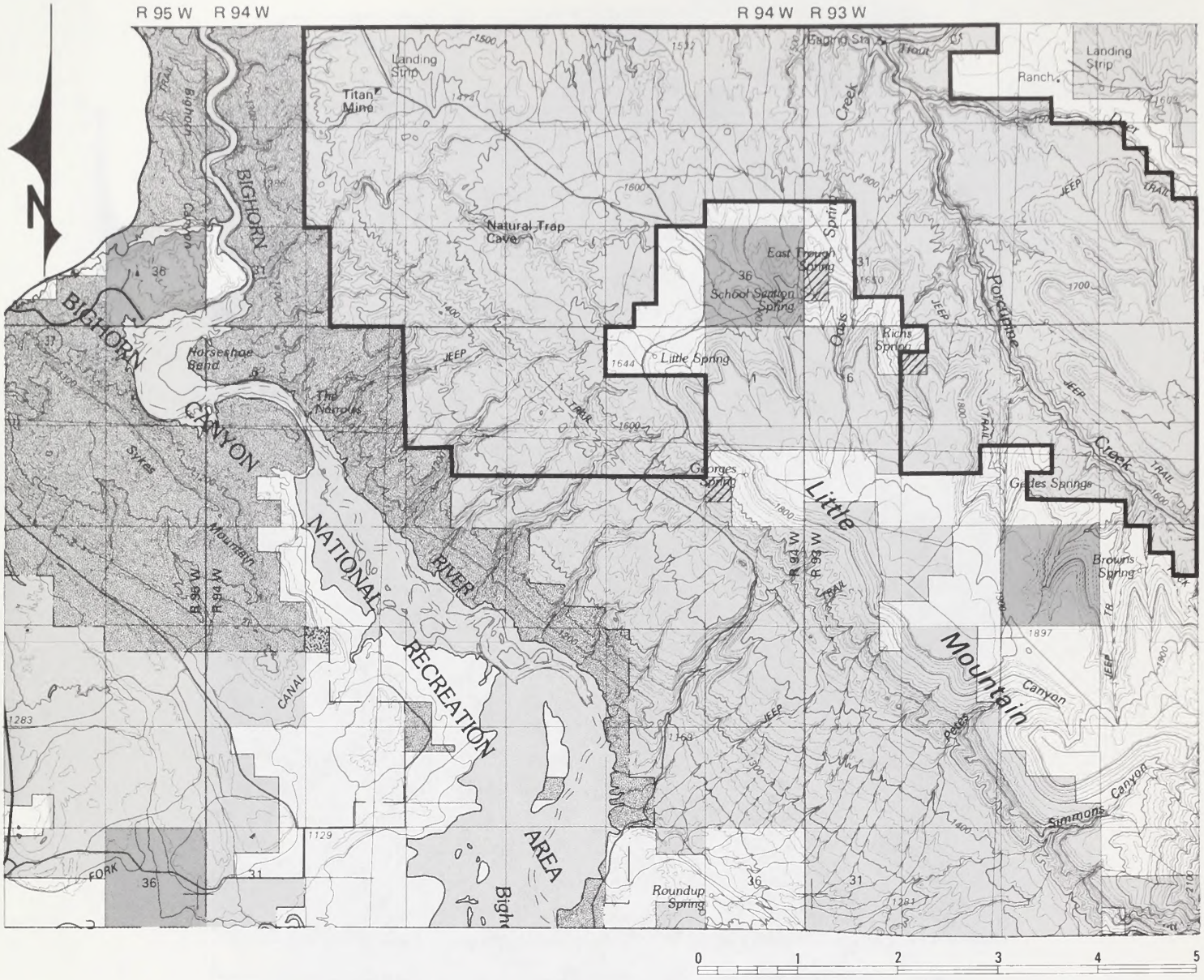
Map 31
Carter Mountain Proposed ACEC



Map 32
Chapman Bench Proposed ACEC



Map 33
Five Springs Falls Proposed ACEC



Proposed ACEC Boundary

BLM-Managed Public Land

State Land

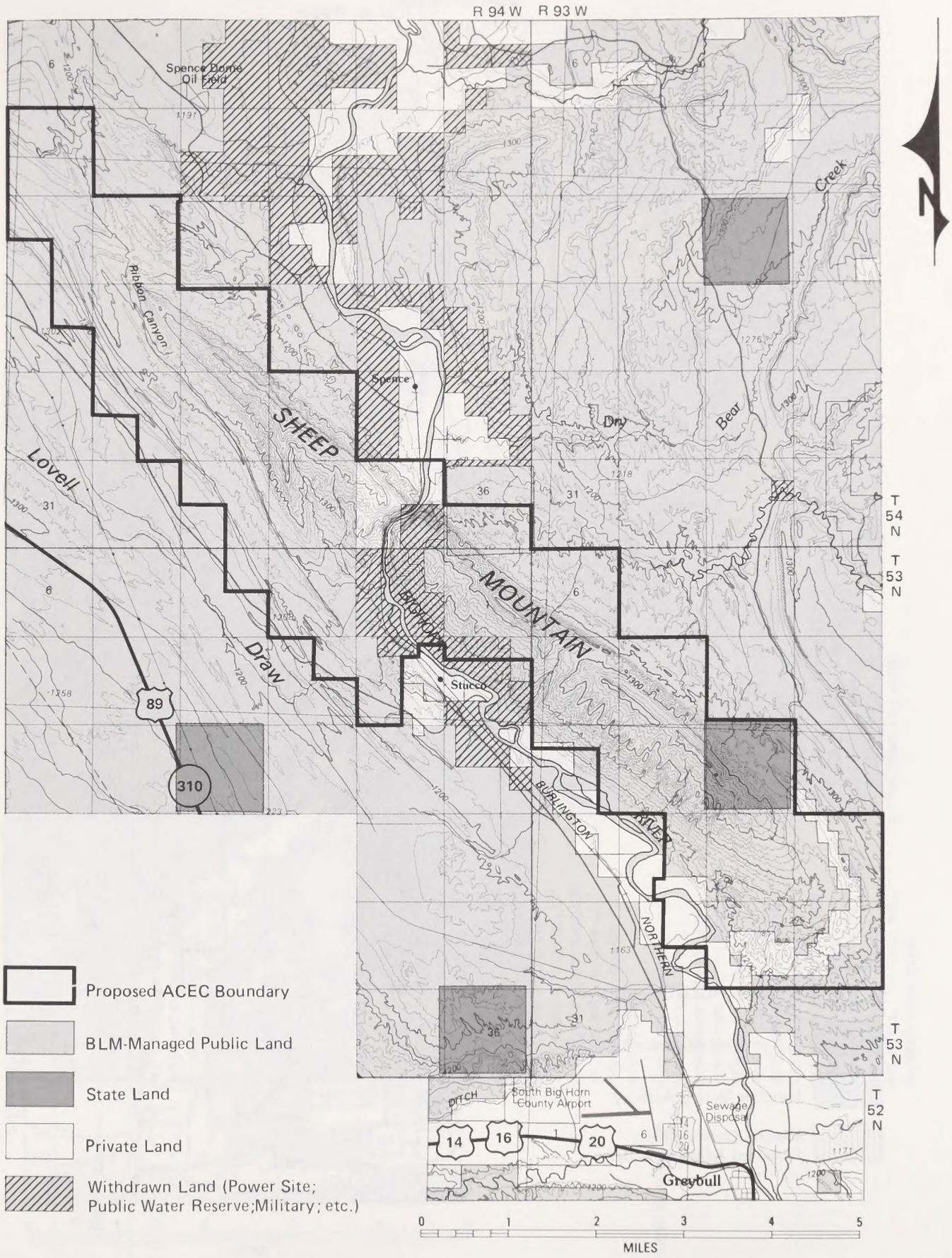
Private Land

National Recreation Area (NPS-administered)

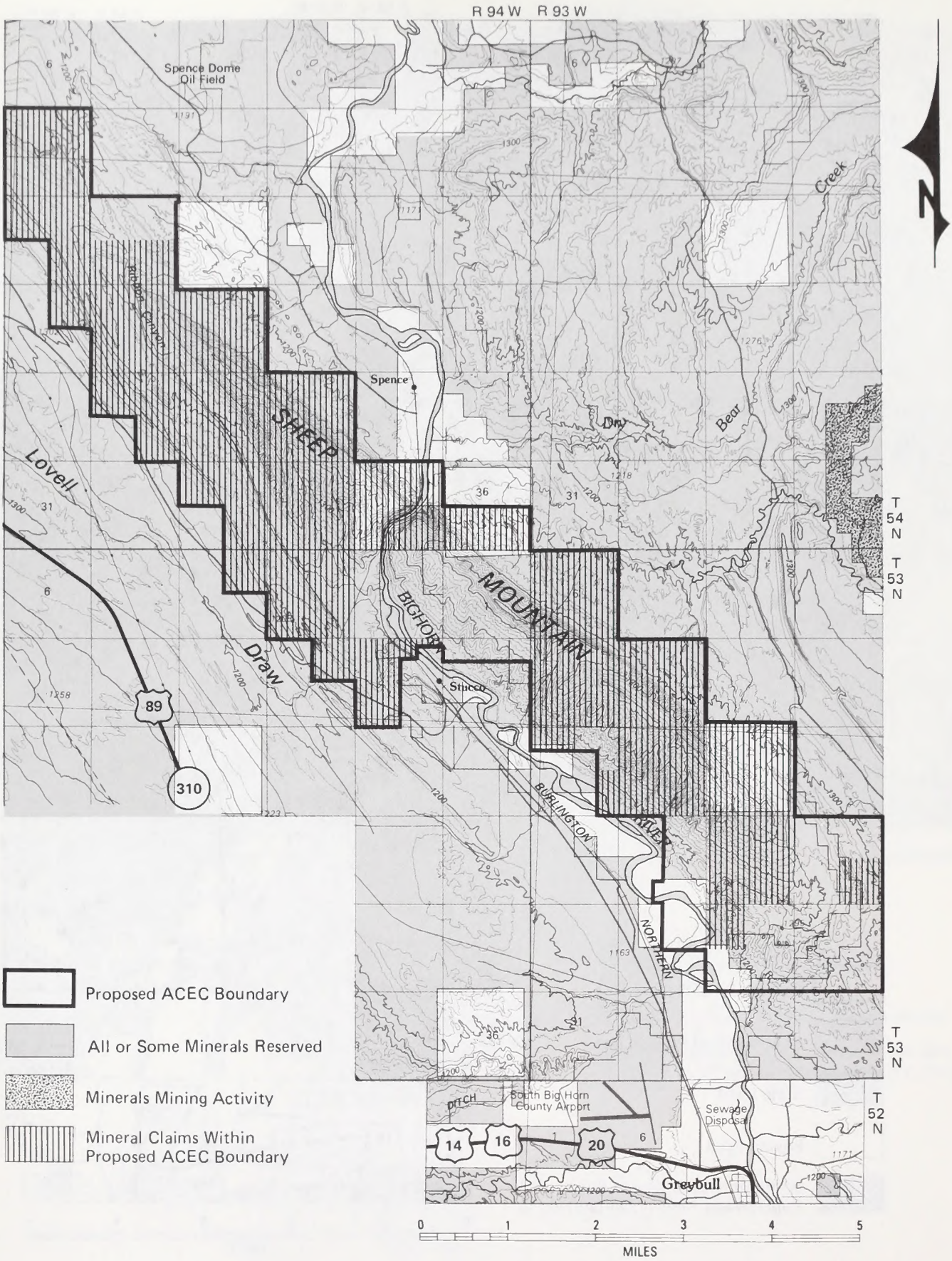
Bureau of Reclamation Withdrawal

Other Withdrawn Land (Power Site Public Water Reserve; Military; etc.)

Map 34
Little Mountain Proposed ACEC



Map 35
Sheep Mountain Anticline
Proposed ACEC—Location



Map 36
Sheep Mountain Anticline
Proposed ACEC—Mineral Claims

TABLE 5

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Air Quality	Air quality would be affected by fire and fire control activities, timber harvest activities, and surface-disturbing activities such as minerals exploration and development and ORV use. These activities would cause particulate emissions in the form of fugitive dust and emissions of gaseous pollutants such as carbon monoxide, hydrocarbons, nitrogen oxides, sulphur oxides, and hydrogen sulfide. While concentrations of particulates and gaseous pollutants would cause temporary effects on air quality, emissions would remain within state of Wyoming air quality standards.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Cultural Resources	Because of the procedures for inventory and protection of cultural resources, minor adverse effects on cultural resources would be anticipated from most surface-disturbing activities. Unintentional damage of cultural resources would occur from wildfire suppression activities, ORV use, and locatable minerals	Same as Alternative A except that there would be less unintentional damage of cultural resources than under Alternative A because heavy equipment for fire suppression would be used less often in limited suppression areas and ORV use would be restricted to existing roads and trails in most of the planning area.	Same as Alternative B	Same as Alternative B

TABLE 5 (Continued)

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	exploration and development.			
Forestlands	Timber harvest activities would improve diversity in the age and size class structure of timber stands.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	The loss of timber productivity from stands that are allowed to become overmature would average about 100 MBF per year.	None of the stands in the timber production base would be managed for overmature characteristics. There would be no loss of timber productivity except in stands outside areas classified as available for timber production.	Same as Alternative A	Same as Alternative A
Geology and Mineral Resources	As existing fields became depleted, oil and gas production would continue to decline, the amount of produced water would decline, and oil spills would occur in approximately the same amounts as in the past.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	In peregrine falcon recovery habitat areas and in the black-footed ferret essential habitat area, restrictions on surface-disturbing activities would increase oil and gas exploration and development costs and could make some areas unavailable for development.	Same as Alternative A except that restrictions would not be used to protect peregrine falcon recovery habitat, and adverse effects on exploration and development would not occur in those areas.	Restrictions on surface-disturbing activities in the following areas would increase oil and gas exploration and development costs and could make some areas unavailable for development: in peregrine falcon recovery habitat areas, in black-footed ferret essential habitat and recovery habitat areas, on slopes between	Same as Alternative C except that restrictions would apply to fewer areas of black-footed ferret recovery habitat and restrictions would be less severe on Bighorn River HMP/RAMP tracts.

TABLE 5 (Continued)
COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
			20% and 25%, and in Bighorn River HMP/RAMP tracts.	
	Restrictions on surface-disturbing activities to protect grouse habitat areas would cause minor economic effects on oil and gas exploration and development.	Same as Alternative A	To proptect grouse habitat areas, surface-disturbing activities generally would be prohibited if more than 10% of a given sage grouse or sharp-tailed grouse habitat area would be affected unless impacts from these activities were intensively mitigated. This would increase the costs of oil and gas development in a few areas where oil and gas fields are in grouse habitat areas.	Intensive mitigation would be required for activities affecting some grouse habitat areas. Locally, this would increase the costs of oil and gas development.
	Restrictions on surface-disturbing activities to protect other wildlife habitat areas, recreational areas, and cave resources would cause minor economic effects on oil and gas exploration and development.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Lands with high value bentonite reserves would continue to be closed to bentonite exploration and development.	The removal of segregations on BOR-withdrawn and C&MU[1] classified lands would make more areas available for locatable mineral exploration and development. Bentonite mining would occur on areas with high value bentonite resources,	Same as Alternative B	Same as Alternative B

TABLE 5 (Continued)

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
		especially in areas north of Cowley. This would have an economically beneficial effect on the bentonite mining industry. Because the deposits are large and processing plants in Lovell are nearby, development costs would be relatively low.		
Livestock Grazing	Range condition and forage availability would be improved or would remain static on four allotments with AMPs through the construction of projects and use of intensive grazing management practices. Forage available for livestock grazing would decrease to a level of about 76,867 AUMs annually after 10 to 20 years.	Range condition and forage availability would be improved through the construction of projects and use of intensive grazing management practices. Forage available for livestock grazing would be at a level of about 93,577 AUMs annually after 10 to 20 years.	Range condition and forage availability would be improved through construction of projects, use of intensive grazing management practices, and reductions in short-term stocking levels. Forage available for livestock grazing would be at a level of about 80,510 AUMs annually after 10 to 20 years.	Range condition and forage availability would be improved through construction of projects and use of intensive grazing management practices. Forage available for livestock grazing would be at a level of about 73,070 to 75,354 AUMs annually after 10 to 20 years.
Recreation	Recreation use would remain at about 216,650 RVDs per year.	Recreation use would increase by about 162,500 RVDs per year through improved access and promotion of recreation opportunities.	Recreation use would increase by about 77,220 RVDs per year through improved access and promotion of recreation opportunities.	Recreation use would increase by about 164,220 RVDs per year through improved access and promotion of recreation opportunities.
	ORV use would be about 4,500 RVDs per year.	ORV use would increase to about 5,400 RVDs per year primarily through providing ORV play areas.	ORV use would be reduced to about 1,850 RVDs per year because of road closures and other limitations on use.	Same as Alternative B
	Opportunities for semiprimitive nonmotorized recreation would occur on	Opportunities for semiprimitive nonmotorized recreation would occur on	Opportunities for semiprimitive nonmotorized recreation would occur on	Same as Alternative A

TABLE 5 (Continued)

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	about 2% of the public lands in the planning area.	about 1% of the public lands in the planning area because of localized increases in surface-disturbing activities.	about 9% of the public lands in the planning area because of road closures and other limitations on ORV use.	
Soils	Accelerated soil loss would continue at a rate of about 2.6 million tons per year. Livestock grazing activities would contribute to about 73% of the total; recreation activities, about 18%; minerals-related surface-disturbing activities, about 9%; and all other activities, less than 1%.	Accelerated erosion would increase by 603,300 tons per year in the short term but decrease by 588,900 tons in the long term. Most of the differences would result from changes in recreation and grazing activities.	Accelerated erosion would decrease by about 685,700 tons per year in the short term and about 775,000 tons in the long term because of changes in recreation and grazing activities.	Accelerated erosion would decrease by about 61,000 tons per year in the short term about 491,000 tons in the long term because of changes in recreation and grazing activities.
Vegetation	On the 75% of the planning area that has been inventoried for ecological condition, about 46% of the range would be in poor condition, about 23% in fair condition, about 11% in good condition, and about 3% in excellent condition after about 20 years.	After about 20 years, approximately 28% of the range on inventoried lands would be in poor condition, about 15% in fair condition, about 36% in good condition, and about 4% in excellent condition.	After about 20 years, approximately 35% of the range on inventoried lands would be in poor condition, about 15% in fair condition, about 28% in good condition, and about 5% in excellent condition.	After about 20 years, approximately 27% of the range on inventoried lands would be in poor condition, about 31% in fair condition, about 21% in good condition, and about 4% in excellent condition.
Visual Resources	The area's scenic quality would be affected by construction, mining, timber harvesting, livestock grazing, ORV use, and recreation activities.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Water Resources	After 10 to 20 years, the increased use of water reinjection wells and the	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 5 (Continued)

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	shutting in of marginally profitable oil and gas wells would cause produced water discharge volume to decline to about 16,200 acre-feet per year. Salt loading would decline to about 78,900 tons per year. This would lead to a slight improvement in water quality in the long term.			
	About 410,900 tons of sediment per year would be delivered to streams in the planning area.	Sediment loads would increase from present rates (Alternative A) by about 52,600 tons per year in the short term. In the long term, sediment loads would decrease from the existing level by about 60,610 tons.	Sediment loads would decrease from present rates (Alternative A) by about 72,490 tons per year in the short term. In the long term, sediment loads would decrease from the existing level by about 81,750 tons.	Sediment loads would decrease from present rates (Alternative A) by about 11,000 tons per year in the short term. In the long term, sediment loads would decrease from the existing level by about 53,000 tons.
Wetlands	Overall, wetland habitat condition would be stabilized or would improve slightly. Habitat improvement projects would improve wetland habitat associated with about 60 reservoirs, 10 miles of streams, and five springs.	Wetland habitat condition would improve by at least one condition class on about 10% of the stream miles on BLM-administered public lands. Most of the improvement would come from changes in livestock grazing management.	Wetland habitat condition would improve by at least one condition class on about 60% of the stream miles on BLM-administered public lands. Most of the improvement would come from changes in livestock grazing management.	Wetland habitat condition would improve by at least one condition class on about 40% of the stream miles on BLM-administered public lands. Most of the improvement would come from changes in livestock grazing management.
Wild Horses	At a herd population of 100, a healthy breeding herd of wild horses would be maintained.	The population level of 75 wild horses would reduce the available genetic pool and cause changes in existing herd characteristics. About 375 more AUMs of forage per year than Alternative A would be available for wildlife and livestock use	Same as Alternative A except that forage available for wildlife and livestock use would be decreased by about 9,500 AUMs annually because of increases in wild horse numbers.	Same as Alternative A

TABLE 5 (Continued)

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
		because of wild horse reductions.		
Wildlife and Fisheries	Through construction of habitat improvement projects and changes in livestock grazing management on four allotments with AMPs, fisheries habitat condition would be stabilized or would improve slightly overall.	Fisheries habitat condition would improve significantly from implementation of new AMPs. About 10% of the stream miles would be improved by at least one condition class.	Same as Alternative B except that about 40% of the stream miles would improve by at least one condition class.	Same as Alternative B except that about 20% of the stream miles would improve by at least one condition class
	Management actions such as vegetative manipulation, access management, and use of timber harvesting to increase edge effect would improve habitat quality in 5,900 acres of high-value forestlands. This would benefit approximately 160 wild animal species including accipiters, cavity-nesting owls, moose, and elk.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Black-footed ferret recovery habitat would be reduced by about 90 acres by oil and gas and bentonite exploration and development.	Effects from mineral development would be the same as Alternative A. Black-footed ferret recovery habitat would be further modified or reduced by about 1,800 acres in the next ten years because of vegetative treatments to increase livestock forage production.	Adverse effects on black-footed ferret recovery habitat would be the same as those in Alternative A; however, approximately 2,500 acres of recovery habitat for black-footed ferrets would be surveyed or improved.	Same as Alternative C
	The quality of about 170 acres of bald eagle production habitat would	Same as Alternative A	Same as Alternative A	Same as Alternative A

TABLE 5 (Continued)

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	be reduced by human intrusions and other activities associated with bentonite mining. This could decrease bald eagle production in 10 to 25 years. The management of high potential bald eagle recovery habitat to promote eagle production and winter support would improve 230 acres of winter support habitat and result in the establishment of one new eagle nest within 10 years.			
	As a result of prergrine falcon reintroductions, six nesting pairs of American peregrine falcons would be expected to occupy portions of the planning area in the next ten years.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Construction of aboveground power lines along major river drainages would lead to increased collision mortalities of water birds and raptors.	Same as Alternative A	The construction of aboveground power lines would be avoided along major river drainages. This would decrease collision mortalities of water birds and raptors compared to Alternative A.	Same as Alternative C
	Human activity from roads within 0.75 mile of raptor nests would cause the abandonment of about five nest sites within 10 years.	Same as Alternative A	Since the construction of roads would be avoided within 0.75 mile of raptor nests, the number of abandoned nest sites would be fewer than under Alternative A.	Same as Alternative C

TABLE 5 (Continued)

COMPARATIVE SUMMARY OF IMPACTS

Affected Resource	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Oil and gas exploration and development would cause abandonment of about six sage grouse strutting grounds, and bentonite mining would cause one strutting ground to be abandoned.	Same as Alternative A, with the addition of five strutting grounds being abandoned because of vegetative treatments to increase livestock forage production.	Adverse effects on sage grouse and sharp-tailed grouse would be less likely than under Alternatives A and B because a provision would prohibit the disturbance of more than 10% of suitable nesting habitat within 2 miles of strutting grounds unless effects on grouse habitat could be intensively mitigated.	Same as Alternative C
	The following effects on big game ungulates would be expected in the next ten years: loss of 3% of the existing bighorn sheep population, 2% of the deer population, 8% of the elk population, 2% of the pronghorn population, and no change in moose population.	The following effects on big game ungulates would be expected in the next ten years: loss of 3% of the existing bighorn sheep population, 5% of the deer population, 13% of the elk population, 3% of the pronghorn population, and no change in the moose population.	The following effects on big game ungulates would be expected in the next ten years: loss of 1% of the existing bighorn sheep population and 10% of the elk population; and increases of 14% in the deer population, 19% in the moose population, and 51% in the pronghorn population.	The following effects on big game ungulates would be expected in the next ten years: loss of 2% of the existing bighorn sheep population, 1% of the deer population, 7% of the elk population, 2% of the pronghorn population, and no change in the moose population.

[1] Abbreviations are defined in the list in the front of the document and/or in a footnote to table 2.

TABLE 6

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Carter Mountain Proposed ACEC	Resources Not Affected	Resources Not Affected	Resources Not Affected	Resources Not Affected
	There would be no adverse effects on air quality, forestland resources, livestock grazing, vegetation, visual resources, water resources, wetlands, or wildlife and fish habitat from management actions in the Carter Mountain proposed ACEC.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Cultural Resources	Cultural Resources	Cultural Resources	Cultural Resources
	Unintentional damage of cultural resources would continue primarily because of ORV use. Locatable minerals exploration and development also could cause unintentional damage.	Same as Alternative A except that there would be less unintentional damage because of restrictions placed on ORV use.	Same as Alternative B except that closure to locatable minerals activities would increase protection of cultural resources from unintentional damage.	Same as Alternative B
	Geology and Minerals	Geology and Minerals	Geology and Minerals	Geology and Minerals
	Surface-disturbing activities would be limited on about 7,000 acres in the proposed ACEC because of slope restrictions to protect fragile soils. This would increase the cost of oil and gas exploration and development because directional drilling would be necessary in some areas.	Adverse effects on exploration and development for oil and gas would be fewer because of the less restrictive slope limitations. About 4,300 acres would be available for surface-disturbing activities.	Potential adverse effects on exploration and development for oil and gas would be increased by the closure of the proposed ACEC to all surface-disturbing activities.	Same as Alternative A

TABLE 6 (Continued)

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Recreation	Recreation	Recreation	Recreation
	Recreation use in the proposed ACEC would be about 1,500 RVDs per year with a possible increase of 1% or 2% because of ACEC designation. Fall hunting would account for 60% of this use; winter activities, 15%; and summer use, 25%.	Recreation use would increase to about 2,500 RVDs per year.	Closure of the proposed ACEC to ORV use would reduce recreation use to about 300 RVDs per year.	Same as Alternative A
	Soils	Soils	Soils	Soils
	Soil losses on about 250 acres would be caused by surface-disturbing activities, primarily those related to oil and gas exploration and development and ORV use.	Soil losses on about 425 acres would be caused by surface-disturbing activities.	Soil losses would be smaller than under Alternative A because of ORV restrictions and mineral closures.	Same as Alternative C
Chapman Bench Proposed ACEC	Resources Not Affected	Resources Not Affected	Resources Not Affected	Resources Not Affected
	There would be no adverse effects on air quality, forestland resources, livestock grazing, visual resources, water resources, or wetlands from management actions in the Chapman Bench proposed ACEC.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Cultural Resources	Cultural Resources	Cultural Resources	Cultural Resources
	Unintentional damage of cultural resources would continue primarily because of ORV use. Cultural resources also could be	The level of unintentional damage of cultural resources from ORV use and the potential for damage from wildfire suppression	Same as Alternative A except that there would be less unintentional damage of cultural resources from ORV use and less potential	Same as Alternative C

TABLE 6 (Continued)

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	damaged if heavy equipment was used to suppress wildfires. Closure of the area to locatable minerals exploration and development could protect cultural resources from some unintentional damage because it would prevent establishment of new mining claims and allow removal of any existing mining claims that did not meet the requirement of validity under the general mining laws.	techniques would be less than under Alternative A. Because the proposed ACEC would not be closed to locatable minerals activities and only half the area would be designated an ACEC, there would be less protection from locatable minerals exploration and development than under Alternative A.	for damage from wildfire suppression techniques.	
	Geology and Minerals	Geology and Minerals	Geology and Minerals	Geology and Minerals
	There would be no adverse effects on oil and gas or locatable minerals exploration and development from management actions in the proposed ACEC.	Same as Alternative A	Overlapping seasonal restrictions to protect wildlife in the Chapman Bench proposed ACEC would limit drilling time to as little as four months in some areas. This would increase the cost of exploration and development for deep gas and could make some exploration uneconomical. However, on the basis of projections of future activity, it appears unlikely that the area would be drilled for deep gas within the next ten years. Shallower reservoirs could be explored and developed	Same as Alternative C

TABLE 6 (Continued)

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
			within the "open" periods allowed by seasonal limitations.	
	Recreation	Recreation	Recreation	Recreation
	Recreation use in the proposed ACEC would be fewer than 50 RVDs per year.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Soils	Soils	Soils	Soils
	Soil loss would be reduced from the present rate because actions to improve range condition would be implemented in one AMP area in the proposed ACEC.	Soil losses would increase because of management actions to enhance long-billed curlew and mountain plover habitat through reduction of vegetative height and density.	Same as Alternative B	Same as Alternative B
	Vegetation	Vegetation	Vegetation	Vegetation
	Range condition would remain static or improve in one grazing allotment that is covered by an AMP in the proposed ACEC.	Range condition would remain unsatisfactory because of management actions to enhance long-billed curlew and mountain plover habitat.	Same as Alternative B	Same as Alternative B
	Wildlife Habitat	Wildlife Habitat	Wildlife Habitat	Wildlife Habitat
	In the proposed ACEC, the quality of production habitat for long-billed curlews and mountain plovers would be reduced by human intrusions and surface-disturbing activities, particularly those related to oil and gas and locatable minerals exploration and development.	Same as Alternative A	Same as Alternative A except that there would be fewer human intrusions and surface-disturbing activities because seasonal restrictions would be applied.	Same as Alternative C

TABLE 6 (Continued)

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Breeding curlews and plovers could be subject to stress from the construction of roads and aboveground power lines.	Same as Alternative A	The potential for stress caused by development of rights-of-way would be less than under Alternative A because the construction of roads and aboveground power lines would be avoided or intensively mitigated.	Same as Alternative C
	Curlews and plovers would benefit from the improvement of 6,000 acres of foraging and production habitat along Sand Coulee Draw.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Five Springs Falls Proposed ACEC	Resources Not Affected	Resources Not Affected	Resources Not Affected	Resources Not Affected
	There would be no adverse effects on air quality, forestland resources, geology and minerals, livestock grazing, soils, vegetation, visual resources, water resources, wetlands, or wildlife and fish habitat from management actions in the Five Springs Falls proposed ACEC.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Cultural Resources	Cultural Resources	Cultural Resources	Cultural Resources
	Closure of the Five Springs Falls area to locatable minerals exploration and development would protect cultural resources from unintentional damage.	Cultural resources could be unintentionally damaged because the area would be opened to locatable minerals exploration and development.	Same as Alternative A	Same as Alternative A

TABLE 6 (Continued)

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	Recreation	Recreation	Recreation	Recreation
	Recreation use would be about 800 RVDs per year.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Little Mountain Proposed ACEC	Resources Not Affected	Resources Not Affected	Resources Not Affected	Resources Not Affected
	There would be no adverse effects on air quality, forestland resources, geology and minerals, livestock grazing, soils, vegetation, water resources, wetlands, or wildlife and fish habitat from management actions in the Little Mountain proposed ACEC.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Cultural Resources	Cultural Resources	Cultural Resources	Cultural Resources
	Unintentional damage to cultural resources would continue primarily because of ORV use. Cultural resources also could be unintentionally damaged through locatable minerals exploration and development.	Unintentional damage of cultural resources would continue primarily because of iocatable minerals exploration and development. However, it would be less than under Alternative A.	Same as Alternative B except that there would be less unintentional damage of cultural resources because the proposed ACEC would be closed to location of new mining claims.	Same as Alternative B except that there would be less unintentional damage of cultural resources because some of the proposed ACEC would be closed to location of new mining claims.
	Recreation	Recreation	Recreation	Recreation
	Recreation use would be about 1,200 RVDs per year. Cave-oriented recreation would account for 60% of the use; hunting and fishing, 28%, and sightseeing, picnicking, and camping, 12%. The lack of ORV restrictions could lower the quality of	Recreation use would increase to about 1,500 RVDs per year through establishment of visitor services, construction of facilities, and placement of directional and interpretive signs. Limitation of ORV use to existing roads and trails	Same as Alternative B except that the greater level of restrictions on ORV use would reduce the potential for lowering the quality of cave resources and caving opportunities.	Same as Alternative C

TABLE 6 (Continued)

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	caving opportunities by disrupting percolation of water into caves.	would not protect the quality of caving opportunities any more than Alternative A because visitation would increase.		
	Visual Resources	Visual Resources	Visual Resources	Visual Resources
	Visual quality would be improved through cleanup of some of the area's uranium mining and exploration diggings under the state of Wyoming's abandoned mined land reclamation program.	Same as Alternative A	Same as Alternative A	Same as Alternative A
Sheep Mountain Proposed ACEC	Resources Not Affected	Resources Not Affected	Resources Not Affected	Resources Not Affected
	There would be no adverse effects on air quality, forestland resources, geology and minerals, livestock grazing, vegetation, water resources, wetlands, or wildlife and fish habitat from management actions in the Sheep Mountain Anticline proposed ACEC.	Same as Alternative A	Same as Alternative A	Same as Alternative A
	Cultural Resources	Cultural Resources	Cultural Resources	Cultural Resources
	Unintentional damage of cultural resources would continue primarily because of ORV use. Cultural resources also could be damaged if heavy equipment was used to suppress wildfires. Because the area would not be designated an ACEC and	Same as Alternative A except that there would be less unintentional damage of cultural resources from ORV use and less potential for damage from wildfire suppression techniques.	Same as Alternative B except that an ACEC designation and closure of part of the proposed ACEC to locatable minerals activities would increase protection of cultural resources from unintentional damage.	Same as Alternative C

TABLE 6 (Continued)

COMPARATIVE SUMMARY OF IMPACTS IN PROPOSED AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Proposed ACEC	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
	would not be closed to the location of new mining claims, locatable minerals exploration and development also could cause unintentional damaged of cultural resources.			
	Recreation	Recreation	Recreation	Recreation
	Recreation use would be about 1,770 RVDs per year.	Recreation use would increase to approximately 3,500 RVDs per year. Interpretive facilities such as a visitor center, improved roads, and directional signing would be responsible for about 50% of this use. The remaining use would be associated with activities such as fishing, hunting, boating, and ORV use.	Recreation use would increase to approximately 2,800 RVDs per year because interpretive and directional signs would be placed in the area and recreational facilities would be built along the Bighorn River.	Same as Alternative B
	Visual Resources	Visual Resources	Visual Resources	Visual Resources
	Visual quality would decline in the Sheep Mountain Anticline area because of continued ORV use and locatable minerals mining and exploration activity.	Same as Alternative A	Visual quality in the proposed ACEC would be better than under Alternative A because of restrictions on ORV use and closure of some areas to location of new mining claims.	Same as Alternative C

3 AFFECTED ENVIRONMENT

INTRODUCTION

This chapter contains a description of the existing physical, biological, and socioeconomic characteristics of the planning area that would be affected by the alternatives described in chapter 2. Much of this information has been summarized from the "Management Situation Analysis," a preliminary report prepared earlier in the planning process. That report can be reviewed in the BLM office at Cody or Worland.

AFFECTED RESOURCES

Air Quality

The airshed within the planning area is classified as Class II, which generally allows concentrations of some air pollutants to increase to accommodate regional economic development. Air quality in the planning area can be described as good. Air contaminants found in the area in small amounts include suspended particulates, hydrogen sulfide, sulfur oxide, nitrogen oxide, and vaporous hydrocarbons.

Concentrations of hydrogen sulfide produced in certain oil and gas fields, such as those mentioned in the "Geology and Minerals" section, range from trace amounts up to about 35% (USDI, Bur. of Mines 1960). Concentrations in and around oil and gas fields may be toxic to humans; however, most produced hydrogen sulfide is oxidized through combustion to the less-toxic sulphur dioxide gas. The risk of hydrogen sulfide poisoning is low if warning signs are heeded, oil field equipment is not tampered with, and enclosed vessels, tanks, and sheds are not entered. Concentrations of hydrogen sulfide outside producing fields rarely would be at levels toxic to humans.

Total suspended particulates (TSP) is the only contaminant for which long-term data are available. The long-term mean for TSP at Lovell is 32 micrograms per cubic meter; at Cody, 8; and at Meeteetse, 18. There has been no violation of either the 24-hour standard of 150 micrograms per cubic meter or the annual standard of 60 micrograms per cubic meter at these locations.

Cultural Resources

Objectives

The objectives of the cultural resource program are described in appendix O of the Washakie final RMP/EIS (USDI, BLM 1987c). That appendix details the procedures and processes that will be used to ensure that cultural and paleontological resources would not be inadvertently destroyed by BLM-authorized activities. These procedures and processes will be followed in the Cody planning area.

Description

Cultural resources in the Cody planning area represent human occupation over many thousands of years. Cultural history in this area is generally believed to have begun at least 12,000 years ago, when the first human groups entered this region. Since that time, human occupation appears to have continued essentially uninterrupted to the present time.

Within the 12,000-year history of the area, there are three broad overlapping periods: the Prehistoric, Protohistoric, and Historic. Remains from each period are found throughout the planning area.

The Prehistoric Period

The Prehistoric period dates from at least 12,000 years before the present (BP) to around 300 years BP. The Prehistoric period is characterized as a stable cultural phase during which the way of life appears to have changed very little. The peoples inhabiting this region during the Prehistoric period were hunters and gatherers who adapted their lifestyle to the high-plains environment. The movements of these nomadic peoples were influenced by seasonal changes in resource availability. The prehistoric sites in this area are generally important for the information they possess, although sites such as petroglyphs and pictographs may be considered important for their stylistic or artistic qualities or for their workmanship.

A three-part division of the prehistoric chronology that recognizes the Paleo-Indian, Archaic, and Late Prehistoric periods is currently in use in Wyoming (Frison 1978). Projectile points characteristic of each of these time periods are illustrated in figure 1. The earliest of the Paleo-Indian cultural traditions, the Clovis Complex, is represented in the planning area only by surface collected artifacts at present. Mid to Late Paleo-Indian cultural material of the Hell Gap, Alberta, and Cody complexes and several specialized mountain adapted complexes are found in and around the planning area. Together, these complexes date between 10,000 and 7,500 years BP. Hell Gap occupations are concentrated in caves and rockshelters around the perimeter of the planning area. Given the number of rockshelters containing deep deposits, it is highly likely that Hell Gap components will be located with future inventory and excavation. The Alberta and Cody complexes are well represented at the Horner site; a multi-component bison kill east of Cody (Frison and Todd 1987).

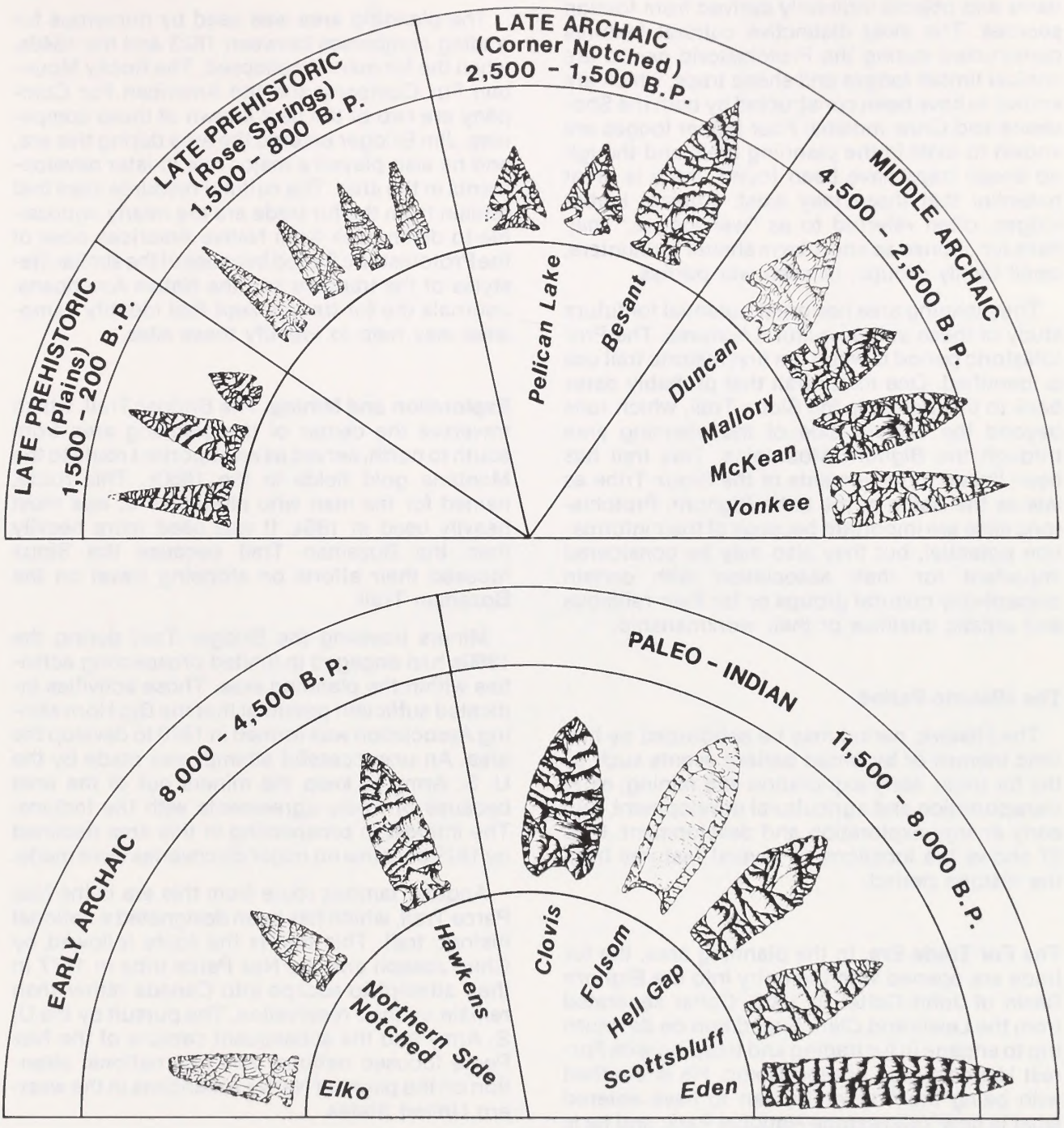
The planning area contains important evidence for specialized mountain adapted complexes of the Late Paleo-Indian Period. These are currently known to occur almost exclusively in the vicinity of the planning area. The Hanson site and sites on Little Mountain contain definitive evidence for these complexes. Other sites also have been documented nearby, including Medicine Lodge Creek, Paint Rock V, Mummy Cave, and the Bighorn Canyon Caves (Frison 1976, 1978; Frison and Grey 1980). Because of its geomorphological setting, with extensive Holocene and Pleistocene terraces and numerous rockshelters, the area contains vast potential for extended Paleo-Indian occupation. The important known evidence and great likelihood for future contributions identifies the planning area as one of the most important areas for research contributing to the understanding of the peopling of North America. Approximately 5% of the known prehistoric sites in the planning area date to this period.

Evidence in the planning area for Early Archaic Period occupations is known only from sites on Little Mountain. These uses are thought to reflect exploitation of animals adapted to more moderate climatic conditions. Numerous Early Archaic components have been identified in caves and rockshelters surrounding the planning area. Given the number of rock shelters in the planning area, it is likely that Early Archaic components will be located in the future. Evidence suggests that although projectile point styles changed from stemmed and lanceolate in the Late Paleo-Indian Period to side and corner notched in the Early Archaic, overall settlement patterns changed little. By Middle Archaic times (5000 to 2500 BP), modern climatic and vegetation patterns appear to have been well established. Evidence indicates a subsistence economy that focused on a broad spectrum of resources, especially deer and sheep. Late Archaic occupations traditionally have been recognized by the presence of diverse corner-notched dart points of the Besant and Pelican Lake complexes dating between 2500 and 1500 years BP. Approximately 55% of the known prehistoric sites in the planning area date to the Archaic Period.

The Late Prehistoric Period (1500 to 250 years BP) can be viewed as a continuation of Archaic adaptations (use of a variety of plants and animal resources) coupled with two innovations: the use of the bow and arrow and the presence of pottery. Sites dating to this period are abundant in the planning area. Artifacts from this period include small side-notched, basally notched, and tri-notched arrowpoints such as Prairie Side-Notched, Plains Side-Notched, Desert Side-Notched, Eden-Farson and Avonlea points (Frison 1978). The Deer Creek site, a Late Prehistoric bison kill, and the Wortham Shelter, a small rockshelter containing Avonlea projectile points and 156 well-preserved arrow shaft fragments, are among the more important sites. Approximately 40% of the known prehistoric sites in the planning area date to this period.

The Protohistoric Period

The Protohistoric period is one of transition from the Prehistoric period to the Historic period. The Protohistoric period is generally considered to have lasted about 100 years, beginning in the late 17th or early 18th century and extending to the early 19th century. The peoples and cultures native to this region experienced significant changes during this relatively short period. Those changes were the result of the introduction of objects and ideas of recent European or Asian ori-



PROJECTILE POINTS FROM VARIOUS TIME PERIODS

gin into the area. Common site types of this period are similar to those of the Prehistoric period, but artifact assemblages may also include early trade items and objects indirectly derived from foreign sources. The most distinctive cultural features constructed during the Protohistoric period are conical timber lodges and sheep traps, which are known to have been constructed by both the Shoshone and Crow Indians. Four timber lodges are known to exist in the planning area, and though no sheep traps have been found, there is great potential that these may exist. Conical timber lodges, often referred to as "war lodges," may have functioned as short-term shelter for hunters, small family groups, or even war parties.

The planning area has great potential for future study of these unique cultural features. The Protohistoric period is when the first historic trail use is identified. One major trail that probably dates back to this period is the Sioux Trail, which runs beyond the eastern side of the planning area through the Bighorn Mountains. This trail has been linked to movements of the Sioux Tribe as late as the Battle of the Little Bighorn. Protohistoric sites are important because of their information potential, but they also may be considered important for their association with certain present-day cultural groups or for their religious and artistic qualities or their workmanship.

The Historic Period

The Historic period may be subdivided by historic themes or by broad pattern events such as the fur trade, early exploration and mining, early transportation and agricultural development, and early energy exploration and development. Map 37 shows the locations of several features from the historic period.

The Fur Trade Era. In the planning area, the fur trade era opened with the entry into the Bighorn Basin of John Colter in 1806. Colter separated from the Lewis and Clark Expedition on its return trip to engage in fur trading and trapping with Forrest Hancock and Joseph Dixon. He is credited with being the first white man to have entered what is now Yellowstone National Park, and he is believed to have been the first white man in the planning area. After separating from Dixon and Hancock in 1807, Colter jointed Manual Lisa's first fur trapping and trading expedition to the Rocky Mountains. Lisa conducted trapping and trading operations in the area from 1807 to 1811. Between 1811 and 1822, a combination of European wars and poor market conditions created a lull in the fur trade, and no documented expeditions operated in this area. The market for furs recovered in 1823, leading to a boom in fur trapping and trading throughout the Rocky Mountains.

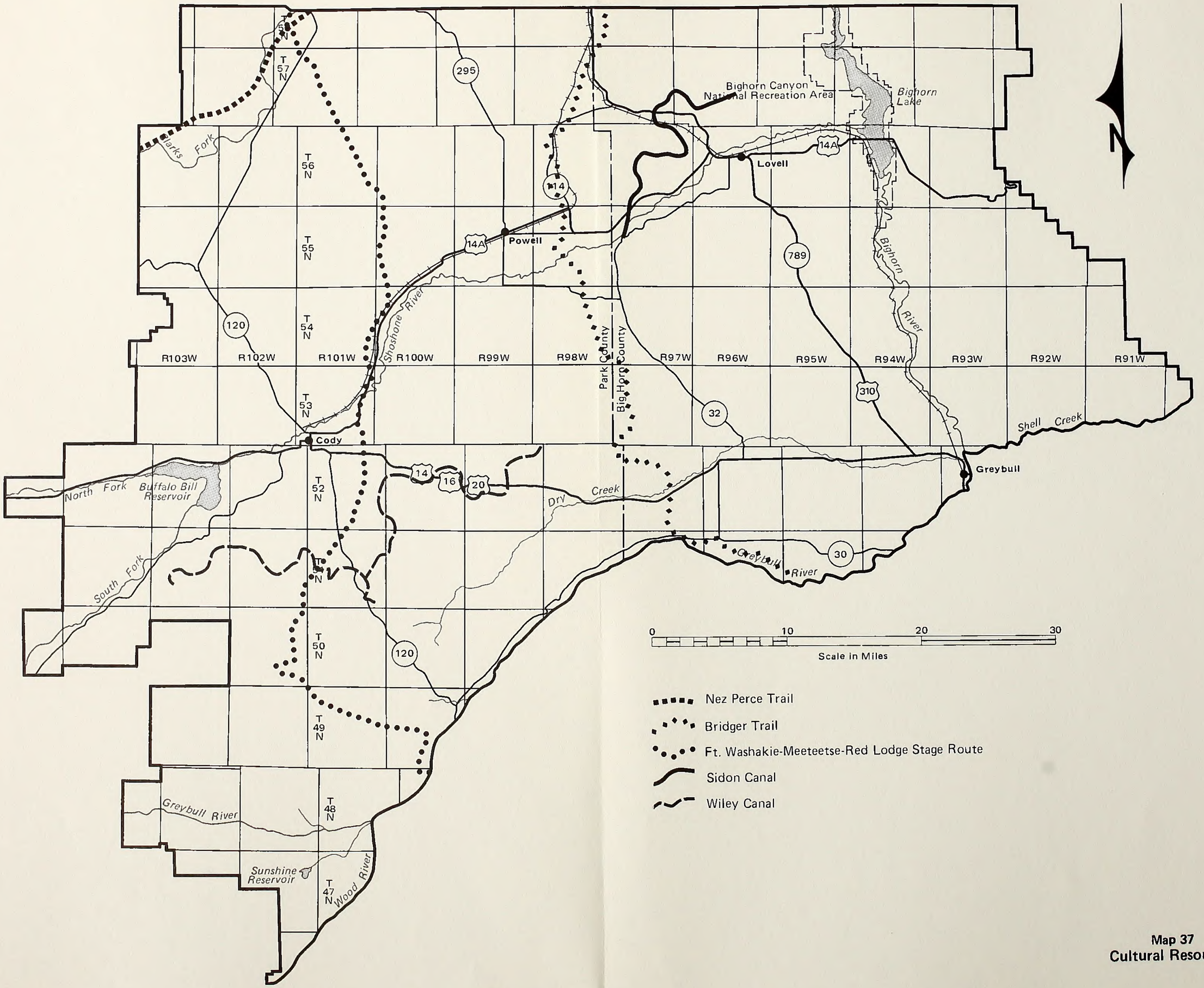
The planning area was used by numerous fur trading companies between 1823 and the 1840s, when the fur market collapsed. The Rocky Mountain Fur Company and the American Fur Company are two of the best known of these companies. Jim Bridger entered the area during this era, and he also played a major role in later developments in the area. The cultural resource sites that remain from the fur trade era are nearly impossible to distinguish from Native American sites of the Protohistoric Period because of the similar lifestyles of the trappers and the Native Americans. Journals the fur traders kept that identify campsites may help to identify these sites.

Exploration and Mining. The Bridger Trail, which traverses the center of the planning area from south to north, served as an important route to the Montana gold fields in the 1860s. This route, named for the man who pioneered it, was most heavily used in 1864. It was used more heavily than the Bozeman Trail because the Sioux focused their efforts on stopping travel on the Bozeman Trail.

Miners traveling the Bridger Trail during the 1860s had engaged in limited prospecting activities within the planning area. Those activities indicated sufficient potential that the Big Horn Mining Association was formed in 1870 to develop the area. An unsuccessful attempt was made by the U. S. Army to keep the miners out of the area because of treaty agreements with the Indians. The interest in prospecting in this area declined by 1879 because no major discoveries were made.

Another famous route from this era is the Nez Perce Trail, which has been designated a national historic trail. This trail is the route followed by Chief Joseph and the Nez Perce tribe in 1877 in their attempt to escape into Canada rather than remain on their reservation. The pursuit by the U. S. Army and the subsequent capture of the Nez Perce focused national and international attention on the plight of Native Americans in the western United States.

Transportation and Agriculture. Early transportation and agricultural development in the area were interrelated.John Dewight Woodruff, a sheepman, established operations in the Bighorn Basin in 1871, where he was the first major stockman. His flocks probably grazed parts of the planning area. Pete McCullough brought the first cattle into the Bighorn Basin in 1879. While there were some conflicts between sheep and cattle op-



Map 37
Cultural Resources

erators, the planning area was not subjected to the intense range wars seen in other areas of the West.

The first irrigation efforts were small diversions to enhance hay production in the 1880s. The success of these efforts led to more extensive canal construction. The most famous of these were the Shoshone Land and Irrigation Company, the Big Horn Basin Development Company, and the Big Horn Colonization Company. The Shoshone Land and Irrigation Company, with "Buffalo Bill" Cody as president, pioneered major irrigation efforts on the Shoshone River. The Big Horn Basin Development Company, formed by Mormons from Utah and Idaho, obtained Shoshone River water rights from Cody's group and constructed the Sidon Canal. This canal made commercial agriculture possible and resulted in the establishment of the towns of Byron, Cowley, and Lovell.

The Big Horn Basin Development Company began but never completed the Wiley Canal on the Greybull River. The route of this canal required the water to flow uphill. The Fort Washakie to Meeteetse road, which was built in 1884 and extended to Red Lodge, Montana, in 1889, was an important freight route in the area. This road provided a link to the railroads, which did not enter the planning area until much later.

Energy exploration and development in the area started in 1907 with the Greybull Oil and Gas Field. This field produced a high quality, lightweight paraffin base oil. Other early fields in the planning area were Cody, Elk Basin, Garland, Byron, Oregon Basin, Silvertip, Badger Basin, Spring Creek, Pitchfork, and Frannie. The oil and gas developments since that time have played a major role in the planning area's history.

The discovery of extremely high grade uranium ore in the Little Mountain area in the 1950s resulted in unusual developments. The ore, which was mined from caves, was shipped by air freight from an airfield near the mines. This is the only uranium mine area in Wyoming where this technique was used.

Sites in the Planning Area

Table 7 describes the acreages inventoried for cultural resources, the total number of sites identified, and the number of sites evaluated as eligible for inclusion on the National Register of Historic Places over the past ten years. The effects of sharp increases or decreases in levels of activity are not reflected in these numbers. The percentage of cultural sites by cultural period is displayed in table 8.

Forestlands

Most of the planning area's forestlands are on Rattlesnake Mountain, and the main forest management emphasis is in that area. In addition, there are forestlands on the west slope of the Bighorn Mountains and on Carter Mountain, and Little Mountain contains some juniper woodlands.

The forest types in the planning area are primarily mixed conifer-lodgepole pine, spruce-fir, and limber pine. The principal species in the mixed conifer class is Douglas-fir, and there is substantial volume in Engelmann spruce. Minor associated species are limber pine, lodgepole pine, and subalpine fir. The broadleaf deciduous trees are primarily quaking aspen, willows, and cottonwoods.

Since 1956, approximately 7,000 acres of mature spruce/fir and lodgepole pine stands has burned in three major fires on Rattlesnake Mountain and many smaller ones. This is a large portion of the 12,900 acres of forestland on Rattlesnake Mountain. Portions of these burns have regenerated into lodgepole; other areas remain nonstocked.

There is a fairly broad variation in the site quality of the forested lands on Rattlesnake Mountain. The upper parts of the mountain with north-facing and northeast-facing slopes and along drainages offer better sites than the lower slopes, where the true forestlands and sagebrush areas meet. Since climate and soils allow intensive management of the timber resources on Rattlesnake Mountain, the area is capable of commercial forest production.

The timber resource on Rattlesnake Mountain is not in good condition. Stands are well past the desirable rotation age, so overmaturity and mortality are high throughout the area, as are infestations of mistletoe, commandra rust, and bark beetles. The timber inventory in the planning area is summarized in table 9.

Geology and Minerals

Leasable Minerals

Approximately 1.51 million acres, or 66% of the mineral estate in the planning area, is federally owned. There are 67 oil and gas fields in 56 known geologic structures (KGSs). By the end of 1984, 15 of those fields were shut in or were no longer producing. In November 1986, a total of 183,360 acres were in KGSs. About 88,000 acres (nearly 6%) of the federal mineral estate is under lease in areas where production is taking place. Leases in

TABLE 7

ACREAGE SURVEYED AND CULTURAL SITES IDENTIFIED ON PUBLIC LAND IN THE PLANNING AREA IN A TEN-YEAR PERIOD

Activity and Program for Which Survey was Done	Acreage[1]	Sites	Number of Sites Evaluated as Eligible for National Register of Historic Places
Oil and Gas			
Well pad	7,970	77	11
Seismic line	2,590	59	12
Roads	950	22	7
Pipeline	380	4	0
Flow line	60	5	2
Mud and discharge pits	10	0	0
Water line	60	0	0
Waste disposal	220	1	0
Tank battery	40	2	1
Oil field	36,450	163	57
Subtotal	**48,730**	**333**	**90**
Minerals			
Sand and gravel	2,700	22	3
Bentonite	650	11	1
Subtotal	**3,350**	**33**	**4**
Lands			
Rights-of-way	3,510	49	12
Reservoir	5,000	13	0
Reclamation	60	4	4
Land sale	4,060	7	2
Desert land entry	2,840	69	6
Other	980	16	6
Subtotal	**16,450**	**158**	**30**
Range			
Spring development	10	0	0
Reservoir	500	5	1
Fence	190	2	0
Pipeline	210	8	4
Other	60	0	0
Subtotal	**970**	**15**	**5**
Other			
Timber sale	170	0	0
Construction	10	0	0
Wildlife	70	0	0
Subtotal	**250**	**0**	**0**
TOTAL	**69,750**	**539**	**129**

Note: It is anticipated that the acreage surveyed and the number of sites discovered in the next ten years would be similar to the figures shown in this table.

[1] Numbers have been rounded.

TABLE 8

CULTURAL SITES IN THE PLANNING AREA BY TIME PERIOD

Period	Percentage of Sites From Each Period	Percentage of Total Sites From Each Time
Prehistoric Time		81
Paleo-Indian	5	
Early Archaic	5	
Middle Archaic	20	
Late Archaic	30	
Late Prehistoric	40	
Protohistoric Time		5
Historic Time		14
Rocky Mountain Fur Trade	1	
Early Military Exploration	2	
Early Mining and Emigration	2	
Livestock Grazing	60	
Transportation and Agriculture	20	
Early Energy Exploration and Development	15	
Total		**100**

TABLE 9

SUMMARY OF FORESTLANDS IN THE PLANNING AREA

Forest Type	Total Acreage within the Timber Production Base[1]	Total Acreage of Forestland
Lodgepole pine	6,214	6,537
Spruce-fir	588	588
Mixed conifer	1,693	3,943
Limber pine	0	1,800
Total	**8,495**	**12,868**

[1] Forestland in the timber production base is managed on a long-term basis for sustained yield. Allowable cut does not include forestland that is not in the timber production base.

such areas are valid as long as production continues. Mineral estate ownership is shown on map 38, a large foldout map in the map pocket.

The planning area contains 43% of the wells in the Bighorn Basin. As of November 1986, 2,272 wells had been drilled, resulting in approximately 10,000 acres of surface disturbance. This includes water wells and water injection wells in addition to the oil and gas wells. Oil and gas exploration has occurred throughout the planning area, with major development in the Elk Basin, Frannie, Byron-Garland, and Oregon Basin fields. Development is concentrated in the north portion of the planning area and in the area south of Cody.

The formations producing the most oil and gas are the Cretaceous age Frontier Formation, the Permian age Phosphoria Formation, the Pennsylvanian age Tensleep sandstone, and the Mississippian age Madison limestone. Additional production is from the Upper Cretaceous age Lance and Mesaverde formations, the Lower Cretaceous age Cloverly Formation, the Jurassic age Morrison Formation, the Triassic age Chugwater Formation, the Ordovician age Big Horn Dolomite, and the Cambrian age Gros Ventre Formation and Flathead Sandstone. Oil production from September 1985 to August 1986 was 22.5 million barrels from 1,074 wells; gas production in the same period was 8.13 billion cubic feet from 31 wells. Cumulative oil and gas production through 1984 totaled 1.29 billion barrels of oil and 775 billion cubic feet of gas.

During a ten-year period from January 1, 1976, to January 1, 1986, 72 exploratory wells were drilled for oil and gas. Sixteen additional applica-

tions for permit to drill (APDs) were processed for exploratory wells that were not drilled. Of the 72 wells, 60 are dry holes at present, 1 is a shut-in gas well, 3 are producing gas wells, and 8 are producing oil wells. Of the shut-in and producing wells, 6 are new field wildcats (drilled more than 2 miles from an existing field) and 6 are new pool wildcats (drilled within 2 miles of an existing field).

Over the ten-year period, approximately 250 acres of surface was disturbed by construction of well locations and access roads for the 72 wildcat wells. The average disturbance per well for initial drilling (including road building) was between 3 and 4 acres.

Oil and gas production activities release gaseous pollutants such as carbon monoxide, hydrocarbons, nitrogen oxides, sulphur oxides, and hydrogen sulfide. These air pollutants are caused by separation facilities, disposal of liquid waste and unwanted gas, burning of waste petroleum products, routine emissions of objectionable odors, and venting of noxious vapors from storage tanks.

Hydrogen sulfide is a colorless, extremely toxic gas often found dissolved in oil. Almost 60% of the fields in the planning area are drilled through known hydrogen sulfide-bearing formations. These formations are the Phosphoria Formation, the Tensleep Sandstone, the (Pennsylvanian) Amsden Formation, and the Madison Limestone. A field undergoing primary recovery in a formation bearing hydrogen sulfide doesn't necessarily produce large quantities of the poisonous gas, but when secondary recovery methods are in operation in those fields, there is a much higher concentration of hydrogen sulfide associated with them. Among the oil fields where hydrogen sulfide is produced are the Silvertip, Elk Basin, Oregon Basin, Pitchfork, Whistle Creek, Garland, and Alkali Anticline fields.

There are coal-bearing strata throughout most of the planning area (see map 39), but most of the coal is poor quality and is uneconomic to mine. There are no active coal leases in the planning area now, and little or no coal activity is expected in the next ten years.

Locatable Minerals

Bentonite and gypsum are the principal locatable minerals in the area, and both are being mined. Uranium can also be found, but no notable mining has occurred in more than 20 years, and none is expected in the next 10 years.

Bentonite-bearing strata are found in a broad band 35 miles long and 18 miles wide along the west flank of the Bighorn Mountains and south of the Pryor Mountains. They also are scattered in a strip roughly 54 miles long and 10 miles wide on the east flank of the Absaroka Mountains (see map 39). With the exception of one bentonite mine on the South Fork of the Shoshone River, mining operations and most exploration and other development activities occur near the Bighorn and Pryor mountains in the eastern part of the planning area. Bentonite-bearing formations include the Cody Shale, the Frontier Formation, the Mowry Shale, and the Thermopolis Shale, all of Cretaceous age. At least 26 separate beds are known within those formations, aggregating about 78 feet of thickness.

There is an outcrop of gypsum-bearing strata in the Jurassic age Gypsum Springs Formation in an area roughly 20 miles long by 10 miles wide on the west flank of the Bighorn Mountains. Gypsum-bearing strata also are found in a 30-mile by 3-mile arcuate strip on the east flank of the Absaroka Mountains. A mine operated by Georgia-Pacific 14 miles south of Lovell is the only currently active gypsum mine in land administered by the BLM. One other gypsum mining operation (2 miles south of Cody) is on private land.

Uranium deposits, generally confined to the Mississippian age Madison Limestone, are found in the Little Mountain Uranium Mining District adjacent to the Bighorn and Pryor mountains and northeast of the Bighorn Lake. Most of Little Mountain is covered by uranium mining claims, but only sporadic production of uranium has occurred since 1963. Uranium deposits in the Little Mountain district are isolated and difficult to predict in the subsurface. They are mined in small quantities because they are deposited as linings or crusts in cavities and caves throughout the karst areas.

Salable Minerals

Sand and gravel are obtained from 26 active free use permits (2,335,000 cubic yards from 1,750 acres), three material sales contracts (37,300 cubic yards from less than 10 acres), and five community pits (on 130 acres) in the planning area. The sand and gravel deposits are scattered throughout the planning area but are most prevalent in ancient river terraces and floodplains, stream valley alluvium, and Pleistocene age glacial deposits.

Map 39
Locatable Minerals

Lands and Realty

Large areas of private land, "split estate" land, and state-owned land are scattered through the planning area. "Split estate" lands are those in which the surface is owned by one landowner and the minerals by another. In the planning area, this generally is nonfederal surface over federal minerals. State-owned lands are primarily sections 16 and 36 of each township (see map 40 in the map pocket).

Livestock Grazing

Livestock grazing is authorized on approximately 1,081,000 acres of federal surface in the planning area, including BOR withdrawals. The remaining unallotted BLM-managed public land, totaling about 7,900 acres, includes small isolated parcels outside existing allotment boundaries or areas that have been withdrawn specifically for other uses such as the protection of wildlife or riparian habitat.

Livestock grazing on BLM-managed public land in the planning area is authorized under section 3 or section 15 of the Taylor Grazing Act of 1934. "Section 15" leases authorize grazing on lands outside the grazing districts formed under that act; "section 3" permits authorize grazing on lands inside the grazing districts. Authorization of livestock grazing on section 15 lands and section 3 lands is essentially the same. In addition to 212 allotments with section 15 leases and section 3 permits, there is one free-use permit in the planning area for one animal unit month (AUM).

A total of 90,895 AUMs are authorized in the planning area, 66,976 for cattle, 23,017 for sheep, and 902 for horses. Grazing is authorized under section 3 permits on 93 allotments totaling 759,191 acres. Outside the grazing district boundary, grazing is authorized by section 15 leases on 120 allotments totaling about 322,000 acres. Seventy operators hold section 3 permits; 89 operators have section 15 leases. Depending on ranch locations and individual requirements, many operators have both section 15 leases and section 3 permits. Grazing allotments are shown on map 41, a large folding map in the map pocket.

There are four AMPs in the planning area covering about 126,700 acres. Most were implemented in the late 1960s and early 1970s and will need to be modified to meet projected goals and accomplish original objectives.

Livestock grazing occurs year-round in the planning area. The lower elevations are utilized mostly during spring, fall, and winter when higher elevations are not accessible. The higher elevations are used in the summer, when vegetation becomes available in those areas. Grazing use varies between operators, depending on the management systems used by each ranch.

A vegetative inventory was conducted in the planning area during 1984-1986 to determine both ecological and livestock forage condition on 80% of the total public acreage in the planning area (see appendix G). The inventory covered 92 allotments; it was concentrated within areas where known resource conflicts were occurring or where past monitoring indicated that current range condition and management could be improved.

A number of range projects have been constructed both for the enhancement and protection of watershed and wildlife values and for the management of domestic livestock grazing. Some of these projects are vegetative manipulations, water developments, and fencing projects. They have been authorized under cooperative agreements or under permits, depending on overall benefits and objectives and private investment levels.

Many of the existing projects were initiated 10 to 20 years ago. Few have been constructed in the last five years because few project funds were available. The only projects being implemented now are projects that involve private investments or projects within allotments that currently are under AMPs or other activity plans for which objectives have been established.

Spraying and seeding have been used to reduce brush species, to allow the more desirable plant species to compete, or to eliminate existing undesirable or invader species. Contour furrowing has been used with spraying and seeding to increase water retention and improve the success of the spraying and seeding. A total of 25,894 acres have been altered through these types of treatments; however, in certain older projects, few benefits are being realized because the original plant communities have reestablished and become dominant.

Water availability in the area is inadequate primarily because of the low annual precipitation received throughout the planning area (5-9 inches) and poor groundwater quality near the surface. Most of the precipitation comes from snow and scattered thunderstorms. Water developments are extremely important to operators.

All allotments in the planning area have been assigned to category "M" (maintain), "I" (improve), or "C" (custodial) according to their rangeland resource characteristics and potential to respond to management. The allotment categorization process (which is described in appendix G) helps managers to identify the intensity of management action needed for each allotment. The categories broadly define management objectives and future management requirements. Multiple-use management prescriptions can then be developed and priorities established for distribution of available funds and personnel.

The specific criteria for allotment categorization are outlined in appendix G. During the categorization process, BLM personnel consulted individually with each permittee, and the existing vegetation inventory was considered. Allotment categories are subject to change as new data become available or conditions change.

Recreation

Types of Opportunities

The planning area receives approximately 1,290,000 recreation visitor days annually. Of this total, about 216,700 (17%) are on BLM-administered public land. Recreation use is summarized in table 10.

TABLE 10

ESTIMATED ANNUAL RECREATION USE IN THE PLANNING AREA (in visitor days)

Type of Activity	Recreation Use Area: West Slope of Bighorn Mountains	East Slope of Absaroka Mountains	Rest of Planning Area	Total Visitor Days
Water-based recreation	800	200	600	1,600
Fishing, hunting and trapping	42,500	21,200	17,300	81,000
Off-road vehicle use	1,900	1,500	1,100	4,500
Cave use	800	200	50	1,050
Sightseeing and other recreational activities	45,600	27,800	55,200	128,600
Totals	**91,600**	**50,900**	**74,250**	**216,750**

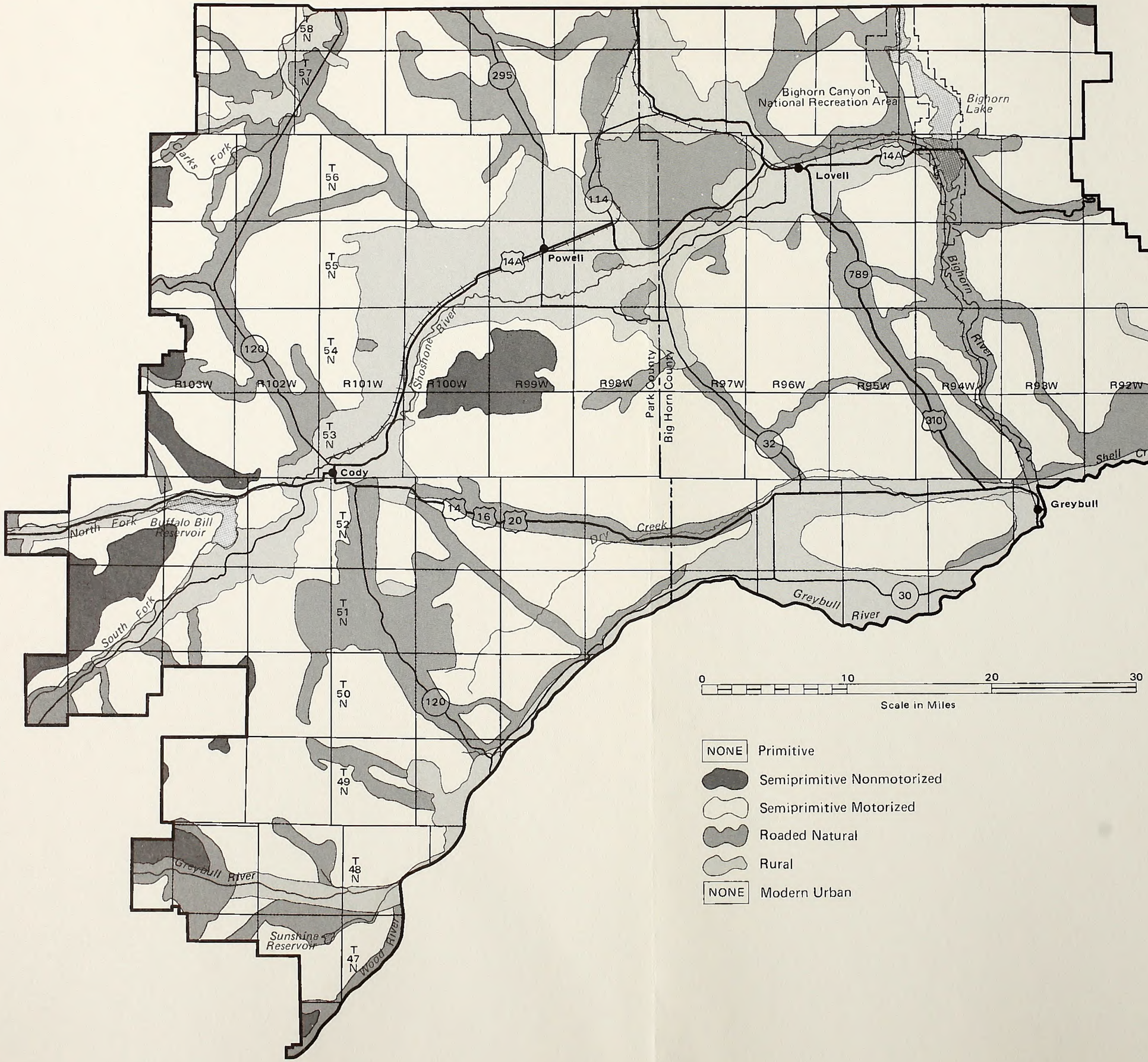
Note: Map 42 shows the locations of recreation areas.

It is estimated that 128,000 recreation visitor days on BLM-administered lands are associated with sightseeing, most of which (85%) take place on or near highways leading to Yellowstone National Park. Increases in public land use have been predicted for such recreational activities as hunting, fishing, picnicking, camping, canoeing-floating, caving, cross-country skiing, and snowmobiling. Recreation opportunities are shown on map 42.

Water-based recreation includes fishing, trapping, waterfowl hunting, and boating. The Bighorn, Greybull, Shoshone and Clarks Fork of the Yellowstone rivers offer opportunities for swimming, canoeing, or stream floating. Larger water impoundments such as Little Sand Coulee Reservoir provide limited opportunities for the use of canoes, small boats, or rafts. These activities usually occur in conjunction with hunting or fishing. The rivers are used nearly year-round, with heaviest use during the hunting seasons (October through January).

Several important fishing streams flow into the planning area from the Bighorn and Absaroka mountains. Other fishing opportunities are limited to reservoirs, most of which are privately owned, and the Bighorn River.

The BLM has not recommended any rivers or river segments in the planning area for inclusion in the Wild and Scenic River System. An environmental statement prepared by the Forest Service,



Map 42
Recreation Opportunities

U. S. Department of Agriculture (USDA, FS 1979) recommended Wild and Scenic River designation for 21.5 miles of the Clarks Fork of the Yellowstone River, all within the boundary of the Shoshone National Forest immediately upstream of BLM-administered public lands. Pending completion of studies to evaluate water development potential in the Clarks Fork Canyon, no action has been taken on this recommendation.

There are abundant opportunities for hunting and trapping in the planning area. Elk hunting is available on the west slopes of the Bighorn Mountains and on Rattlesnake Mountain and Carter Mountain in the Absaroka Range. Antelope and deer can be hunted throughout the planning area wherever suitable habitat exists to support them. Waterfowl hunting is available along the major watercourses and on reservoirs. Hunting for small game and predators and trapping of furbearers also is possible in areas that are suitable habitat for these animals.

Off-road vehicle use occurs primarily on the west slope of the Bighorn Mountains, on the Absaroka Front, and near Cody and Lovell. Approximately 60% of the 4,500 annual recreation visitor days on BLM-administered land are associated with four-wheel drive use during hunting season, 30% with motorcycle and all-terrain vehicle use near Cody and Lovell, and 10% with snowmobile use in the Carter Mountain area and near the boundaries between BLM-administered land and land administered by the Forest Service, U. S. Department of Agriculture (FS).

All public lands in the planning area have inherent recreational value and offer some level of opportunities for recreational activity. Current annual recreation use is discussed in chapter 4 under "Alternative A." The recreation opportunity spectrum process identifies recreation opportunities on the basis of the area's setting and activities. Map 42 shows the four recreation opportunity classes: semiprimitive nonmotorized, semiprimitive motorized, roaded natural, and rural.

Opportunities for semiprimitive nonmotorized recreation are available on 51,200 acres. These opportunities offer solitude in natural environments and activities such as camping, hiking, sightseeing, spelunking, nature study, hunting and fishing.

Opportunities for semiprimitive motorized recreation are available on 1,365,800 acres. This term explicitly includes an opportunity to use motorized equipment in a natural environment. Some of these activities are ORV use (four-wheel drive vehicles, dirt bikes and all-terrain vehicles), sightseeing, and nature study.

Opportunities for roaded natural recreation are available on 460,000 acres. Such opportunities offer affiliation with others in an isolated environment in activities such as picnicking, rock collecting, wood collecting, and driving for pleasure.

Opportunities for rural recreation are available on 406,400 acres. These are opportunities for competitive activities, spectator sports, and bicycling.

Cave Recreation

The planning area has 18 known caves. Several have outstanding decorations, extensive passageways, or vast paleontological resources, making them of national or international significance. The caves generally are in three areas: Little Mountain-West Slope, the Absaroka Front, and Sheep Mountain Anticline. These caves are visited by approximately 1,050 spelunkers each year.

The most extensive cave system west of South Dakota is in the Little Mountain-West Slope karst area. It is of national and international significance. Horsethief Cave, a cave of national and international significance, is a complex maze with approximately ten miles of known passages, and there is high potential for the discovery of additional passages. Horsethief Cave is one of the most decorated caves in the northern United States. Speleothems range from extremely fragile gypsum angel hair and pure white gypsum flowers to colorful calcite stalactites, stalagmites, and flowstone. The cave offers ample opportunity for exploration, climbing, photography, and solitude. Approximately 500 spelunkers visit the cave annually.

Natural Trap Cave, also in the Little Mountain-West Slope karst area, is of national and international significance. The cave is characterized by an 80-foot deep sinkhole and two miles of passageway containing many paleontological resources, including Pleistocene camel, wolverine, pine marten, Pleistocene bighorn sheep, North American lion, and mammoth. Available recreational opportunities include high-risk activities such as rappelling, ascending, and cave exploration. Approximately 200 spelunkers visit Natural Trap annually.

In addition to Horsethief and Natural Trap Caves, there are at least six other caves in the Little Mountain-West Slope karst area. The potential for more caves is high. Jayhawk Pit, near Natural Trap, contains a 25-foot drop and a phreatic maze. Also in the vicinity are three unnamed crawlways of approximately 50 feet each. Cake Pasture Cave on the east side of Devils Canyon has a vertical pit entrance and several decorated rooms. Red Seep Cave, which is near Cake Pasture Cave,

is of unknown length and decoration. Visitation to these caves is limited because of a lack of public knowledge, access problems, inaccessibility in certain seasons, and the need for specialized equipment and experience. Despite these limitations, approximately 25 spelunkers visit these caves annually. Several caverns on Little Mountain were mined for uranium in the 1950s and early 1960s. These caverns contain extremely high readings of radon gas and are not visited by spelunkers. However, they are evidence that there may be other extensive cave systems in the Little Mountain-West Slope karst area.

The Absaroka Front has several caves of regional and national importance, including Spirit Mountain Caverns. The caverns were discovered in 1904 by Ned Frost and promoted by "Buffalo Bill" Cody. Later the caverns were designated a national monument, and in 1955 the city of Cody began managing them as a commercial cave. In 1975, because of financial problems, the commercial cave venture failed and the caverns reverted to the BLM.

Unfortunately, vandalism has destroyed many of the decorations in Spirit Mountain Caverns over the years. However, because of their complexity and diversity, the popularity of these caves for exploration and skill learning is high. Approximately 200 spelunkers visit Spirit Mountain Caverns annually.

The Absaroka Front also contains Rattlesnake Pit and several other small caves. Rumors of other caves in this area abound, and the potential is high that other major caves will be discovered. There are opportunities for exploration, but exploration is limited because of lack of public knowledge, access problems, inaccessibility in certain seasons, and the need for specialized equipment and experience. It is estimated that there are fewer than 25 visits per year to the known caves.

The Sheep Mountain Anticline area contains several caves that are of regional and national significance despite their relative shortness. Spence Cave is the most extensive, with 2,000 feet of primary passage. Decorations, which are sparse, include a soft type of gypsum crust. Lower Kane and Hellespont caves are characterized by live springs with moderate amounts of hydrogen sulfide gas. All the caves in the Sheep Mountain Anticline are thermal, a fairly rare method of cave development; they have an average temperature of approximately 80? F. This uniqueness accounts for the caves' national significance. Recreational opportunities include education and high-risk activities such as climbing and exploring. It is estimated that there are approximately 30 visits a year to these caves.

Soils

The soils in the planning area have developed in parent materials derived mostly from sedimentary rocks. The soils at lower elevations (which constitute most of the area) were formed from relatively soft siltstones, mudstones, sandstones, and shales. Areas associated with badlands or steep slopes have mostly shallow and moderately deep soils, while more stable and level areas have moderately deep and deep soils.

The arid climate dries the root zones during much of the growing season and limits profile leaching. Consequently, most of these soils are poorly developed, lack fertile topsoil layers, and retain many features of their parent materials such as high salinity, alkalinity, and carbonates; low organic matter; and in many cases residual rock content.

The soils in the eastern and western ends of the area derived mostly from relatively hard limestones, sandstones, and shales and from gravelly alluvium extending from the mountain fronts. At higher elevations, the more moist, cooler climate promotes more profile leaching and distinctive horizon development than in the basin soils. Consequently, most soils at higher elevations have greater fertility and lower salinity and alkalinity.

The planning area contains numerous floodplains and valleys that have deep and very deep alluvial soils. These soils are stratified and relatively undeveloped. It also contains three unique landscapes: YU, Polecat, and Chapman benches. These benches differ from most other parts of the area because of their elevated and nearly level landscapes, erosional stability, and higher degrees of soil development.

Soil survey information, geology, vegetation, and slope maps provide a basis for identifying the ten general soil units described in table 11. Map 43 shows the location of these soil units. These units differ on the basis of bedrock type, topography, climate, elevation, and general soil features. There are about 820,000 acres of fragile soils, which are characterized by their shallowness, steep slopes, high erodibility, susceptibility to compaction and crusting, and low reclamation potential (see map 44).

Most of the soils have erosion tolerances of 1 to 3 tons per acre per year. Many of these soils are experiencing wind and water erosion in excess of these levels because of past management practices and harsh site conditions. Wind erosion is common in the western part of the planning area.

TABLE 11

GENERAL SOIL UNITS IN THE PLANNING AREA

Soil Unit	Percentage of Area	Characteristics
B1	18	Deep and very deep soils with variable textures, salinity and alkalinity. Formed in alluvium on fans and valleys.
B2	21	Shallow and moderately deep, variably textured soils with high salinity and alkalinity and moderate carbonates. Formed in soft sedimentary rocks.
B3	12	Mostly shallow, medium-textured soils and badlands having high salinity and alkalinity and moderate carbonates. Formed from soft sedimentary rocks.
B4	8	Shallow to deep, sandy and loamy soils with medium salinity and alkalinity. Formed mostly from soft sandstones and mudstones
B5	5	Shallow to deep, mostly medium-textured soils with medium to high gypsum content and low to medium salinity and alkalinity. Formed from loamstones, sandstones, and shales.
B6	13	Shallow and moderately deep, mostly fine-textured soils with high salinity and alkalinity. Formed from gray and and black shales and siltstones.
B7	3	Moderately deep and deep, medium-textured soils on nearly level benches, with medium to high carbonate contents and low salinity and alkalinity. Formed mostly in gravelly alluvium.
B8	4	Moderately deep and deep, mostly medium-textured soils with low to high salinity and alkalinity. Formed in alluvium and colluvium from sedimentary rocks.
M1	7	Shallow and moderately deep sandy and loamy soils with variable gravel contents and low salinity and alkalinity. Formed mostly from limestone, sandstone, and volcanic rocks.
M2	9	Shallow to deep, variably textured soils with low to high salinity and alkalinity. Formed in alluvium from sedimentary rocks.

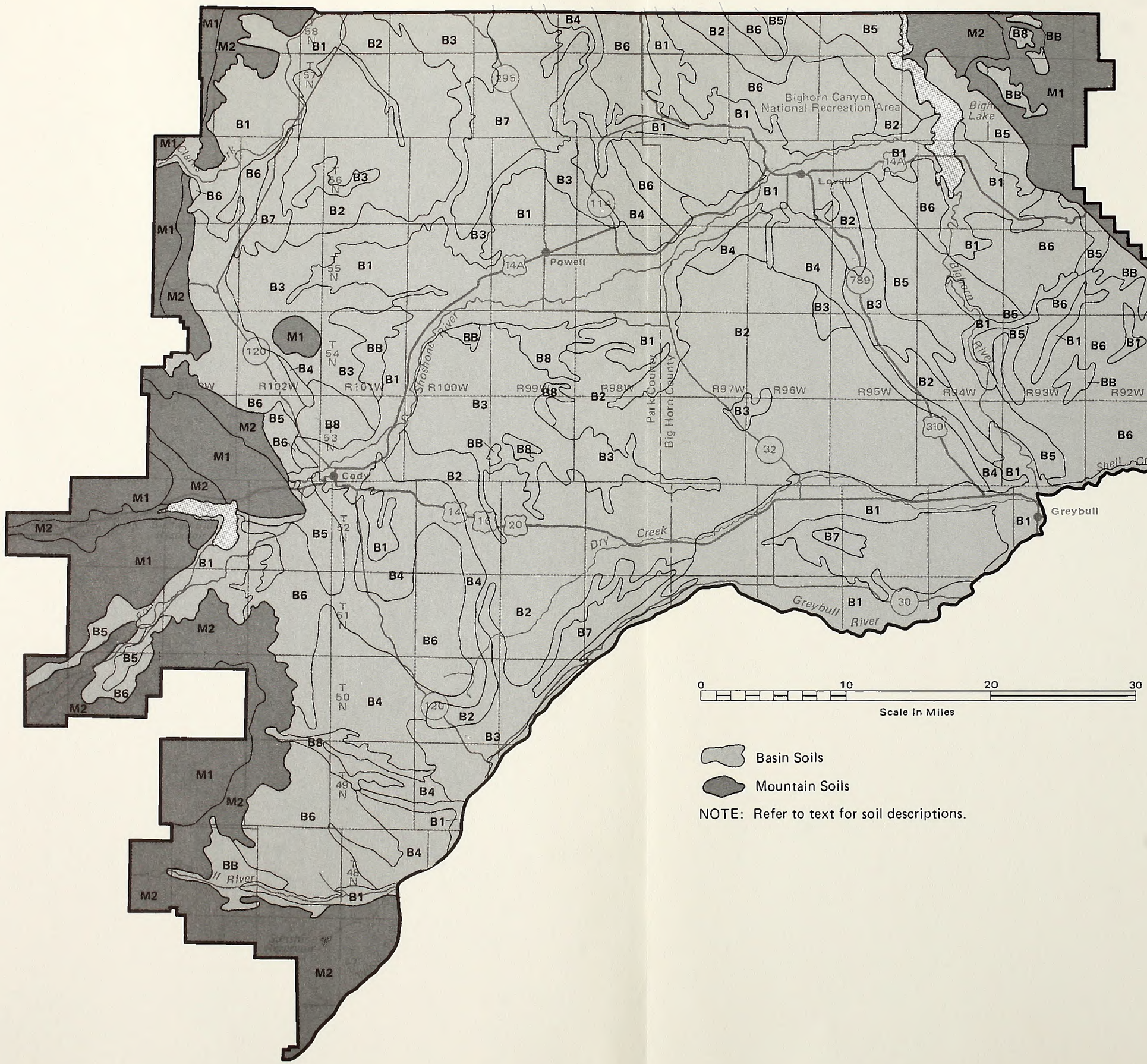
Accelerated erosion in the planning area is approximately 2.65 million tons per year as a result of resource use activities. This is a rate of about 2.45 tons per acre per year. Ritter (1975) estimated that the natural erosion rate historically has been about 0.6 foot per 1,000 years in the Bighorn Basin. This amounts to an average of about 1.3 tons per acre per year. If this estimate is correct, about 1.42 million tons of soil are lost naturally each year. The total soil erosion in the planning area from these two causes is almost 4.1 million tons per year, or an average of approximately 3.75 tons per acre per year.

Soil survey maps, detailed descriptions, and interpretive information for the planning area are available for review at the Cody Resource Area office.

Vegetation

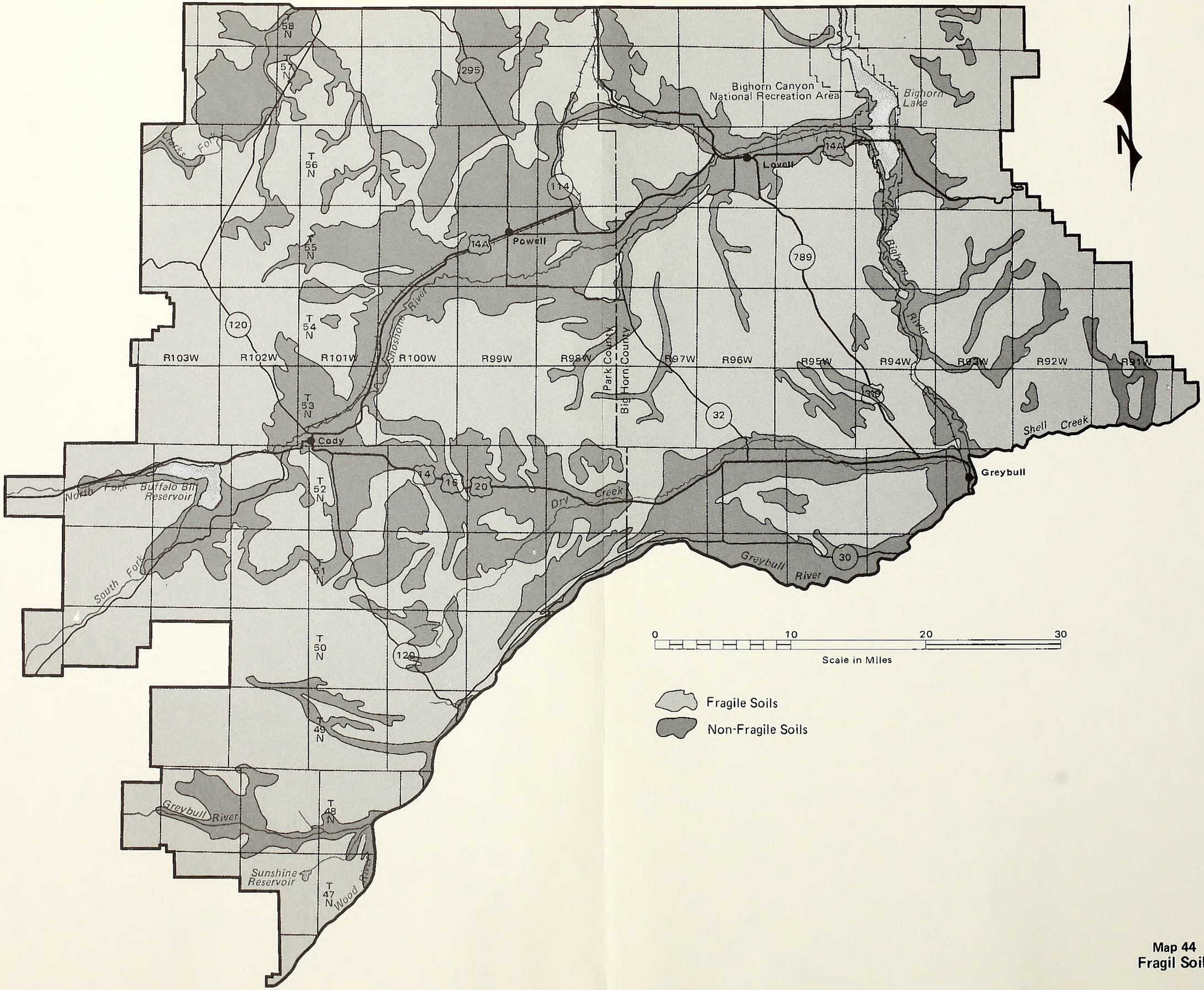
Description

Vegetation in the planning area is highly variable, depending on soils, topography, elevation, climate, and aspect. Distribution of vegetative communities depends on soils, elevation, and moisture regime. Map 45 shows the locations of the various vegetative types.



NOTE: Refer to text for soil descriptions.

Map 43
General Soil Units



Map 44
Fragil Soils

The planning area contains portions of geographic delineations described by the Soil Conservation Service, U. S. Department of Agriculture (SCS) as major land resource areas (MLRAs). These areas and precipitation zones are shown on map 46.

The Northern Intermountain Desertic Basin areas are in the 5 to 9 inch annual precipitation zone. Soils in this MLRA are mesic (warm) and aridic (dry). This extensive warm, dry area includes approximately the center two-thirds of the planning area. This area is drained by the Shoshone and Bighorn rivers. The predominant plant species in this MLRA are shrub/grass vegetation types, including Nuttall's saltbush, big sagebrush, rhizomatous wheatgrasses, needle-and-thread grass, and Indian ricegrass.

The Northern Rocky Mountain area is in the 15 to 19 inch annual precipitation zone and in the zone where annual precipitation is more than 20 inches. Soils are frigid (cold) or cryic (colder) and shallow to moderately deep. This wet, cold area is limited to the extreme eastern and western portions of the planning area along the Bighorn Mountains and the Absaroka Front; thus, this MLRA comprises less than 10% of the entire planning area. Coniferous forest is the major vegetative community, with Douglas-fir, lodgepole pine and Utah juniper dominating. Various grass, forb, and shrub species are understory components in this area.

The Northern Rocky Mountain Foothills area consists of well-drained, frigid soils in the 10 to 14 inch precipitation zone. The area occupies a midslope position between the Northern Intermountain Desertic Basin and the Northern Rocky Mountain MLRAs, on the eastern and western fringes of the planning area. This MLRA comprises approximately 25% of the land mass of the planning area. Grass/shrub communities make up the major vegetative types; however, some areas are brush covered and others are forested. Dominant species include Idaho fescue, bluebunch wheatgrass, and western wheatgrass with Rocky Mountain and Utah juniper, curl-leaf mountain mahogany, and skunkbush sumac.

Vegetation Types

Overall Information

The 12 plant communities in the planning area and their estimated acreage are listed in table 12. Type distinctions are based on the dominant species that provides the characteristic aspect of each area.

The 12 vegetation types mentioned above can be correlated with SCS range sites for the Bighorn Basin and the Northern Rocky Mountains. Table 13 contains detailed information about the status of vegetation by precipitation zone.

Details on ecological condition class by range site are available in the Cody Resource Area office. Range sites in approximately 75% of the planning area have been inventoried according to the methods described under "Vegetation Inventory Methods" in appendix G, and inventoried range condition by allotment is listed in the same appendix.

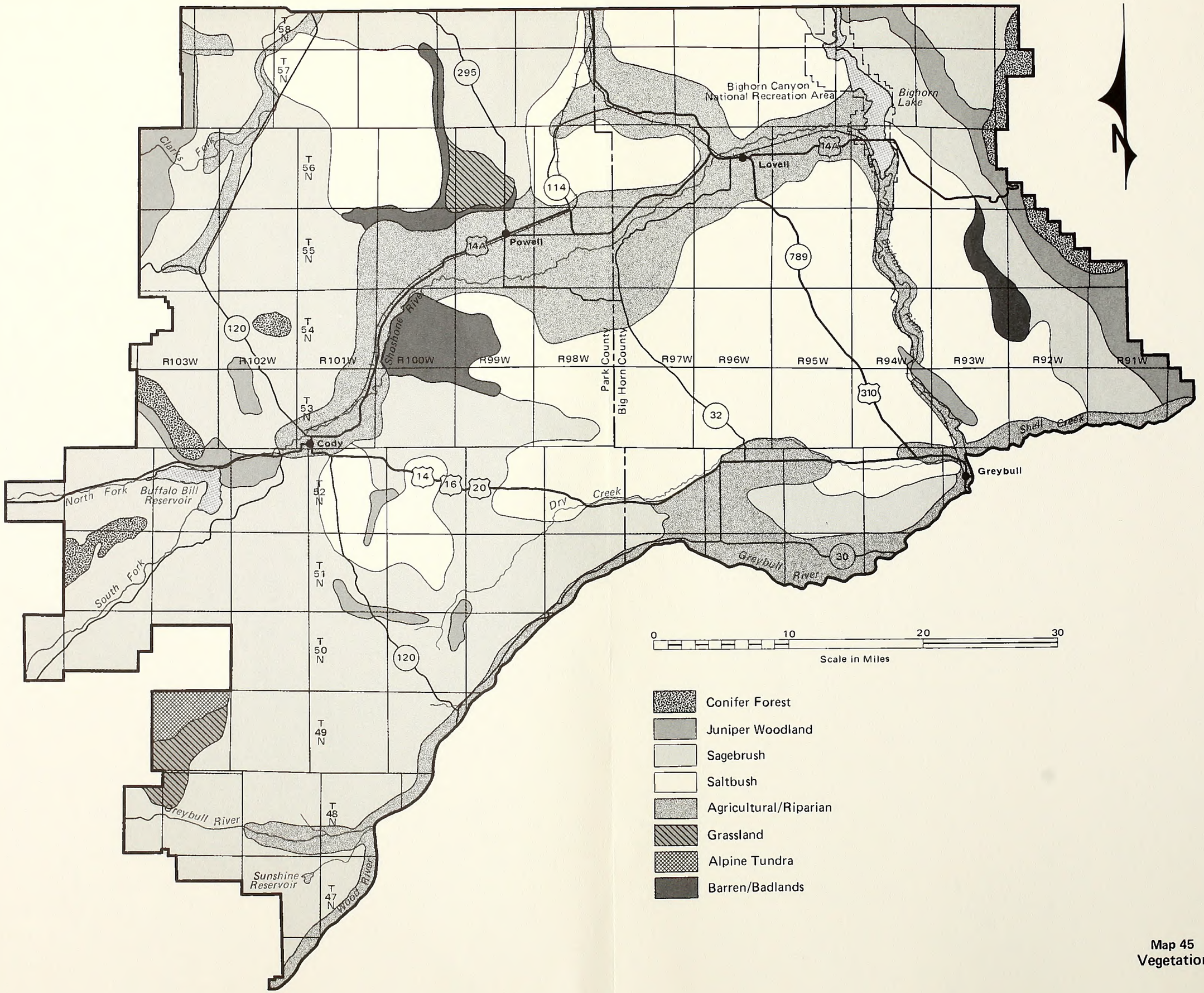
Salt Shrub

The salt shrub vegetation type generally is found in low precipitation areas with heavy soils that have various levels of alkalinity/salinity. The type occurs in both lowlands and uplands, in floodplains or in intermittent drainages of the semiarid basins. In low-lying areas along ephemeral stream courses, the salt shrub type tends to integrate with the greasewood type. Nuttall's saltbush is the dominant species on this type, with annual grasses in the early seral stage and perennial grasses in the late seral stage. Common understory species include Indian ricegrass, bottlebrush squirreltail, pricklypear cactus, scarlet globemallow, and bluebunch wheatgrass. Plant cover in this type is often sparse because of environmental factors; however, the type provides important winter range for both domestic livestock and big game species.

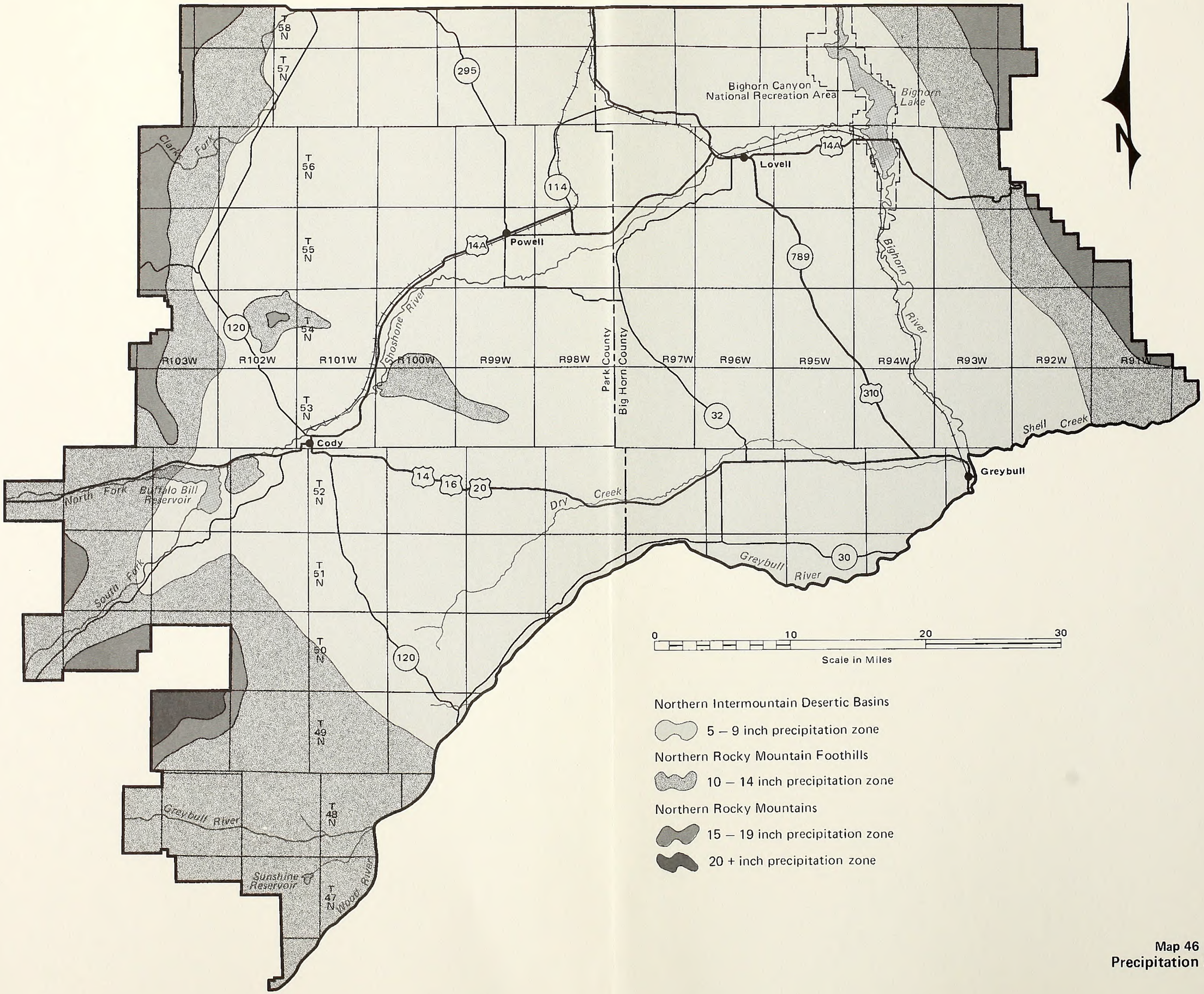
Sagebrush

The sagebrush type is common throughout the 5 to 9 inch and 10 to 14 inch precipitation zones. This type is characterized by a dominance of basin and Wyoming big sagebrushes in association with low-growing shrub and half-shrub species (snakeweed, winterfat, shadscale, black sagebrush, fringed sagewort, rabbitbrush) and a variable understory of perennial grasses and annual and perennial herbaceous broad-leaved species. Sagebrush dominance often indicates range deterioration from former grassland or sagebrush/grass plant communities to sagebrush communities.

The presence and production of annual species is influenced by annual and seasonal climatic variations. Shrub canopy cover varies from one site to another, but it is relatively constant in any given area over time. Shrub stands occupy a range from very open stands supporting a diverse productive understory to a completely closed canopy where



Map 45
Vegetation



Map 46
Precipitation Zones

TABLE 12

PLANT COMMUNITIES IN THE PLANNING AREA

Plant Community	Acreage	Inventoried Area (%)	Ecological Condition Class			
			Poor (%)	Fair (%)	Good (%)	Excellent (%)
Salt shrub	251,335	31	68	26	5	1
Sagebrush	128,531	16	42	36	22	less than 1
Grassland	126,086	15	60	20	15	5
Badland/rock outcrop[1]	115,478	14	—	—	—	—
Sagebrush/grass	71,772	9	30	35	27	8
Mixed Shrub	61,554	8	58	28	11	3
Juniper	11,995	2	39	37	24	0
Mountain shrub	11,610	2	4	10	26	60
Conifer[1]	3,349	less than 1	—	—	—	—
Greasewood	2,629	less than 1	88	12	0	0
Riparian/wetland	1,797	less than 1	95	5	0	0
Other[2]	28,287	3	—	—	—	—
Total	**814,423**					

Note: The ecological site method was used to inventory 814,423 acres. As of March 1987, approximately 266,826 acres had not yet been inventoried.

[1] SCS condition classes do not apply to this type.

[2] SCS condition classes were not determined.

TABLE 13

STATUS OF VEGETATION BY PRECIPITATION ZONE

Condition	Acreage in Each Precipitation Zone				Total Acreage
	5-9 inches	10-14 inches	15-19 inches	20 or more inches	
Poor	323,411	33,874	10,797	3,395	371,477
Fair	156,542	29,071	1,622	0	187,235
Good	72,484	18,100	1,902	0	92,486
Excellent	13,152	6,994	1,918	0	22,064
Undetermined/rock outcrop	122,034	11,329	7,322	476	141,161
Total inventoried	687,623	99,368	23,561	3,871	814,423
Total uninventoried	N/A	N/A	N/A	N/A	266,826
Total	**687,623**	**99,368**	**23,561**	**3,871**	**1,081,249**

sagebrush competition allows few understory species. Some areas of this type were formerly grasslands that have been invaded by sagebrush through a combination of climatic and human-induced factors. The sagebrush vegetation type has only limited utility for livestock but provides important yearlong and seasonal wildlife habitat.

Grassland

The grassland vegetation type is dominated by various grass species on uplands, lowlands, benches and gentle to moderately steep slopes. It occurs in small patches in association with other vegetative types where soil and moisture regimes are more conducive to grass growth.

Grasslands consist of perennial grasses in association with broad-leaved herbaceous species and scattered half-shrub and shrub species. Some grasslands have significant amounts of annual grasses (cheatgrass brome) and prickly-pear cactus. The presence of cactus, annuals, and large amounts of blue grama not only lowers the ecological condition rating of the type (see table 12), but also indicates a downward trend. The dominant perennial grasses include bluebunch wheatgrass, western wheatgrass, Indian ricegrass, needle-and-thread, blue grama, prairie junegrass, and bluegrasses. Historical uses and climatic and environmental fluctuations have influenced the present grassland distribution, densities, and production.

Many former grassland types have been invaded by sagebrush, greasewood, juniper, and other shrubs and half-shrubs. The grassland type is one of the most important vegetation types for livestock and wildlife.

Badlands-Rock Outcrop

Badlands and rock outcrops are areas where the combination of slope with soil and moisture conditions is so harsh as to preclude establishment of an effective vegetative cover. Most of the badlands type are devoid of vegetation because of a lack of soil development over bare rock; however, small areas within the type are vegetated with Nuttall's saltbush, shadscale, horsebrush, bottlebrush squirreltail, and western wheatgrass. Badlands offer limited opportunity for consumptive use or improvement of the vegetation resource.

Sagebrush/Grass

The sagebrush/grass community is found in the 5 to 9, 10 to 14, and 15 to 19 inch precipitation zones. Generally, sites that support a sagebrush/grass community are more diverse and are in better relative ecological condition than are those supporting the sagebrush type (see table 12). Sagebrush/grass communities have an obvious sagebrush component but still contain a high percentage of perennial grasses in the understory. A typical example of this type would contain a combination of big or black sagebrush, bluebunch wheatgrass, needle-and-thread, green needlegrass, Idaho fescue, and other grasses or forbs and shrubs. This type is very important as forage for livestock and as habitat for numerous wildlife species.

Mixed Shrub

The mixed shrub type is similar in distribution and species composition to the sagebrush type. It is generally found either in close association with the sagebrush type or on sites that could or would support the sagebrush vegetation community. In most cases, the species present are identical to those in the sagebrush vegetation type. However, sagebrush is not the dominant species in the mixed shrub type. The difference between the types is in the relative species composition of the shrub component. Other shrubs and half-shrubs, including rabbitbrush, greasewood, snakeweed, shadscale, saltbush, horsebrush, and spiny hopsage combine with sagebrush to compose the shrub component, with no single species having dominance. High vegetative diversity and low grass production give these types varied utility as livestock forage and wildlife habitat.

Juniper

The juniper vegetation type is dominated by various juniper species. Juniper occurs on shallow, rocky, well-drained soils on slopes or terraces where bedrock is near the surface. Juniper trees in the planning area grow from 8 to 30 feet in height in densities ranging up to 90-100%. Understory vegetation includes bluebunch wheatgrass, needle-and-thread, prairie junegrass, Indian ricegrass, bluegrasses, and various broad-leaved herbaceous perennials and annuals. On disturbed sites, annual cheatgrass brome can become an important vegetative component.

The juniper type provides valuable cover for elk during the winter and for mule deer yearlong. High juniper density limits the ability of this type to produce forage.

Mountain Shrub

The mountain shrub community is often dense. It occupies well-drained soils on slopes in close association with the juniper type. It is composed primarily of curl-leaf mountain mahogany, skunkbush sumac, and black sagebrush. The typical understory contains bluebunch wheatgrass, Idaho fescue, other wheatgrasses, sedges, and various broad-leaved herbaceous species. The type has limited value for livestock grazing because it occurs on steep terrain, and the thick vegetation impedes livestock movement. It provides valuable forage and cover for several wildlife species; for example, it is valuable winter habitat for mule deer.

Conifer

The coniferous type is composed of several kinds of evergreens, including limber pine, Douglas-fir, Engelmann spruce, subalpine fir, and lodgepole pine in various combinations. Understory is minimal in some areas because of canopy closure. Conifers are limited to mountainous and often steep areas on the extreme eastern and western fringes of the planning area. The type provides very little forage for livestock; however, it is important as cover and habitat for wildlife.

Forest production activities are limited to Rattlesnake Mountain. There is little opportunity for harvest or intensive forest management in the rest of the planning area.

Greasewood

The greasewood type is found in basin floodplains, low-lying areas adjacent to intermittent streams, and alluvial fans. Soils supporting this type generally are poorly drained and saline or alkaline. Greasewood is the dominant species forming dense stands. Understory is generally sparse because of poorly drained, saline soils and competition from the greasewood overstory. Greasewood sites are promoted by disturbances of vegetation and surfaces around water. When vegetation cover is reduced or destroyed, soil erosion increases, water tables are lowered, and the more desirable, healthy, and less tolerant riparian vegetation types are replaced by greasewood.

Wetland/Riparian

The wetland/riparian vegetation type is found along the Shoshone, Bighorn, and Greybull river systems, along many small perennial and intermittent streams, and around hundreds of springs and reservoirs. Most of the wetland/riparian areas are on private land. However, there are significant wetland/riparian areas on public lands on 212 linear miles along Dry Creek, Big Sand Coulee, Greybull River, Bighorn River, Shoshone River, and other perennial or ephemeral drainages. Cottonwoods, willows, gooseberry, chokecherry, cattails, and rushes exist in riparian areas along perennial or intermittent streams, marshlands, lakes, wetlands, and subirrigated lands.

In many instances wetland/riparian vegetation occurs in areas too small to be delineated from surrounding types, such as around small livestock water reservoirs. Riparian vegetation is important as food, cover, and nesting habitat for a diverse variety of domestic and wild species. Ten exclosures along the Bighorn River, one on Dry Creek, and one on the South Fork of the Shoshone River protect wetland/riparian vegetation on approximately 904 acres. However, much of the wetland/riparian community is in poor to fair ecological condition (see table 12).

Other Types

Various parts of the planning area contain small but locally significant areas dominated by communities of annual forbs, perennial forbs, or grasses and forbs in co-dominance. In addition, there are areas of alpine tundra, areas of undetermined types, and areas that have been so disturbed as to be devoid of vegetation. The only one of these areas large enough to be identified on map 45 is the alpine tundra on Carter Mountain.

Vegetation Inventory

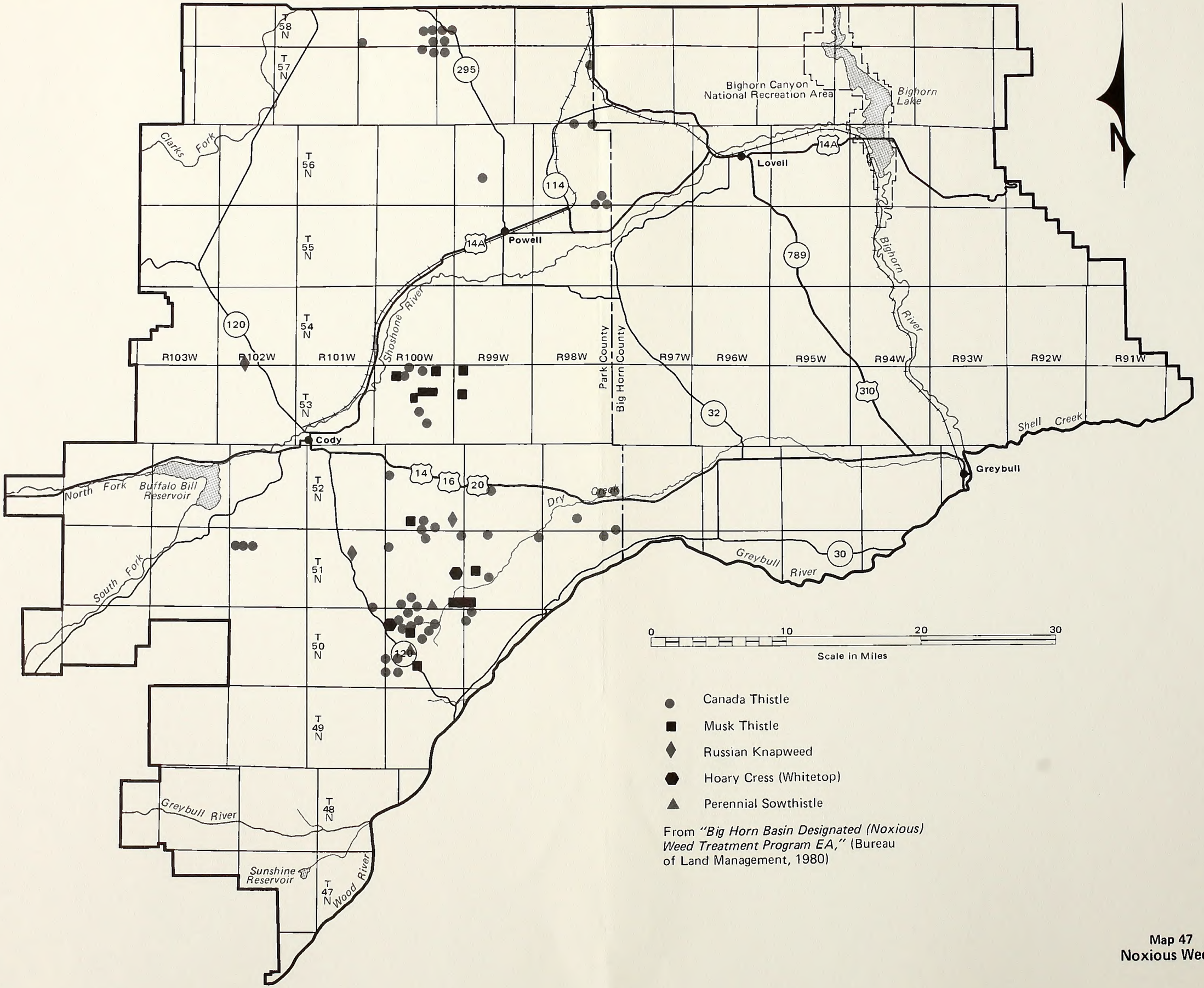
An ecological site inventory project for the Cody Resource Area has been in progress since 1984. To date 814,423 acres have been inventoried as indicated on table 12 and described in the section on vegetation inventory in appendix G. Although the inventory of the remaining 266,826 acres continues, it is not yet complete. Vegetation types in the uninventoried area are predominantly sagebrush, sagebrush/grass, mountain shrub, grassland, juniper, and conifer.

Noxious Weeds

Noxious weeds reduce or eliminate desirable vegetation from public lands by competing with native plants for water, sunlight, and soil nutrients. The BLM has statutory authority to control and eradicate noxious weeds on public lands. Seven weed species have been identified for control in the planning area: musk thistle, Canada thistle, Russian knapweed, spotted knapweed, sow thistle, whitetop, and common burdock. Their locations are shown on map 47.

Plant Species for Special Consideration

The planning area is not known to contain any designated threatened or endangered plant species. However, there are plant species in the planning area that are candidates for threatened or endangered listing or for other special management considerations. Those species are listed in table 14.



- Canada Thistle
- Musk Thistle
- Russian Knapweed
- Hoary Cress (Whitetop)
- Perennial Sowthistle

From *"Big Horn Basin Designated (Noxious) Weed Treatment Program EA,"* (Bureau of Land Management, 1980)

Map 47
Noxious Weeds

TABLE 14

RARE PLANTS IN THE PLANNING AREA

Plant Species	Common Name	Locality
Erigeron allocotus	Bristly fleabane	Big Horn County
Eriogonum lagopus	Unnamed wild buckwheat	Big Horn County
Penstemon caryi	Cary beardtongue	Big Horn County
Stanleya tomentosa	Wooly princesplume	Big Horn County
Sullivantia hapemanii	Hapeman sullivantia	Big Horn County
Draba pectinipila	Comb-hair draba	Park County
Cymopterus evertii	Evert water parsnip	Park County
Antenaria aromatica	Aromatic Pussytoes	Park County
Lomatium attenuatum	Absaroka biscuitroot	Park County
Shoshonea pulvinata	Shoshonea	Park County

Visual Resources

Within the Cody planning area there are 549,000 acres of highly scenic lands along the slopes and canyons of the West Slope, Absaroka Front, Sheep Mountain Anticline, Heart Mountain, and McCullough Peaks. These areas are in visual resource management (VRM) Class II (see appendix H) and are managed primarily for their visual resources. They are shown on map 16. The remainder of the planning area, primarily badlands and rivers, is rated VRM Classes III and IV and is managed so that resource uses and surface disturbances do not dominate the landscape.

The planning area may be broken into three scenic categories; badlands, major rivers, and the mountain slopes of the Bighorns and Absarokas.

Badlands, which occupy a majority of the planning area, are characterized by contrasting colors, erosion, drainages, and panoramic views of the Bighorn Mountains and Absaroka Front. Colors such as light brown, gray, purple, white, red, black, salmon, and pink dominate the landscape. There is very little water in the badlands; therefore, vegetation is sparse. Sagebrush, grasses, some junipers, and mountain mahogany are the major vegetation species.

Major rivers are the Bighorn, Shoshone, Greybull and Clarks Fork of the Yellowstone. River bottoms have been extensively modified by farming and small communities but still have tracts of unmodified woodlands and grasslands. The river bottoms are characterized by irrigated farmlands, low rolling hills and bluffs, and panoramic views of the Bighorn Mountains and the Absaroka Range. Vegetation makes up the predominant colors, with shades of green, tan, yellows, and browns.

The west slope of the Bighorn Mountains is characterized by rugged escarpments with massive rock outcrops and dramatic folding and faulting of rock strata. Devils Canyon, noted for its deep vertical walls and wild running stream, is the most spectacular of the west slope canyons. Colorful vegetation includes coniferous and deciduous trees, sage, and mountain mahogany. Colors of rock and soil vary from gray to tan with shades of red. Creeks, springs, seeps, and resurgences are unique and invite exploration.

The Absaroka Front is characterized by steep ridges with sometimes dramatic erosional patterns and by mesas and plateaus with views of the Beartooth Plateau, Heart Mountain, and the Bighorn Mountains. The reds, tans and grays of the rock and soil contrast with the greens or tans of the grasses and dark greens of the conifers to provide interesting textures. The Clarks Fork of the Yellowstone River emerges from the steep, dramatic uplifts. The "Flatirons" of the Clarks Fork Canyon is an unusual formation.

Water Resources

Surface Water

Description

The planning area is drained by two large subbasins of the Missouri River Basin: the Clarks Fork of the Yellowstone River and the Bighorn River (see map 48). The Clarks Fork receives flow from 251,100 acres (11% of the planning area) in the northwest corner of the planning area, while the Bighorn River collects flow from the remaining 89% of the planning area (2,031,900 acres). The

Greybull and Shoshone river basins are major tributary streams.

A small closed drainage, Loch Katrine, captures produced water from the Oregon Basin oil field. This amounts to less than 1% of the entire planning area. It is estimated that 3,061,000 acre-feet of water per year pass through the planning area in main stem subbasin streams. Approximately 10% of the total originates within the planning area boundaries through ephemeral runoff, spring flow, and produced water discharges. A breakdown of water yield, watershed acreages, and percentage of public land holdings within each tributary is presented in table 15.

Uses

Water uses depend on water availability and water quality. Table 16 shows the uses of streams, rivers, and reservoirs in the planning area determined by the Wyoming Department of Environmental Quality (DEQ), as well as DEQ's and WGFD's classifications of these waters.

Quality

Water quality within the headwaters regions of most streams is good. However, as a stream enters the lower basin, both salinity and sediment concentrations increase because of natural geologic erosion and through point and nonpoint source pollution loadings. A total of 2.2 million tons of salt per year and 5.1 million tons of sediment per year flow through and out of the planning area through mainstem subbasin streams. Excluding irrigated land contributions, 1,182,900 tons of salt and 410,900 tons of suspended sediment are delivered from the planning area (see table 17).

Salinity limits the use of water for agricultural, municipal, industrial, and recreational purposes. The state of Wyoming considers stream segments of the Bighorn and Shoshone rivers to be impaired by salinity. The saline shales in the Cody, Mowry, and Thermopolis formations, which outcrop east of the Bighorn River and in the Dry Creek drainage, are natural sources of salts. The shales contribute sodium and calcium sulfate salts to streams that flow through the outcrops.

The discharge of produced waters from the large oil fields is the primary source of human-caused salinity. Produced waters typically are more saline than perennial receiving waters. Some produced water discharges exceed 5,000 milligrams per liter (mg/l) of total dissolved solids. About 19,000 acre-feet of water and 93,000 tons of salt are discharged annually through permitted produced water discharges. Table 18 lists the quantities of produced water discharges and salt loadings by drainage.

Sediment degrades water quality and restricts the use of water by transporting nutrients and pesticides. This increases the cost of municipal water treatment, degrades fisheries resources, decreases storage capacities of reservoirs, and damages crop and irrigation facilities. Sediment is considered the most widespread and serious water pollutant in the Bighorn Basin. Sediment limits the uses of the Bighorn River, the Shoshone River from Buffalo Bill Reservoir to Bighorn Lake, the Greybull River from its mouth upstream to Meeteetse, Bitter Creek, and the South Fork of the Shoshone River. Big Sand Coulee was cited as a major source of sediment to the Clarks Fork drainage in the *208 Statewide Water Quality Management Plan for Wyoming* (Wyo. DEQ 1979).

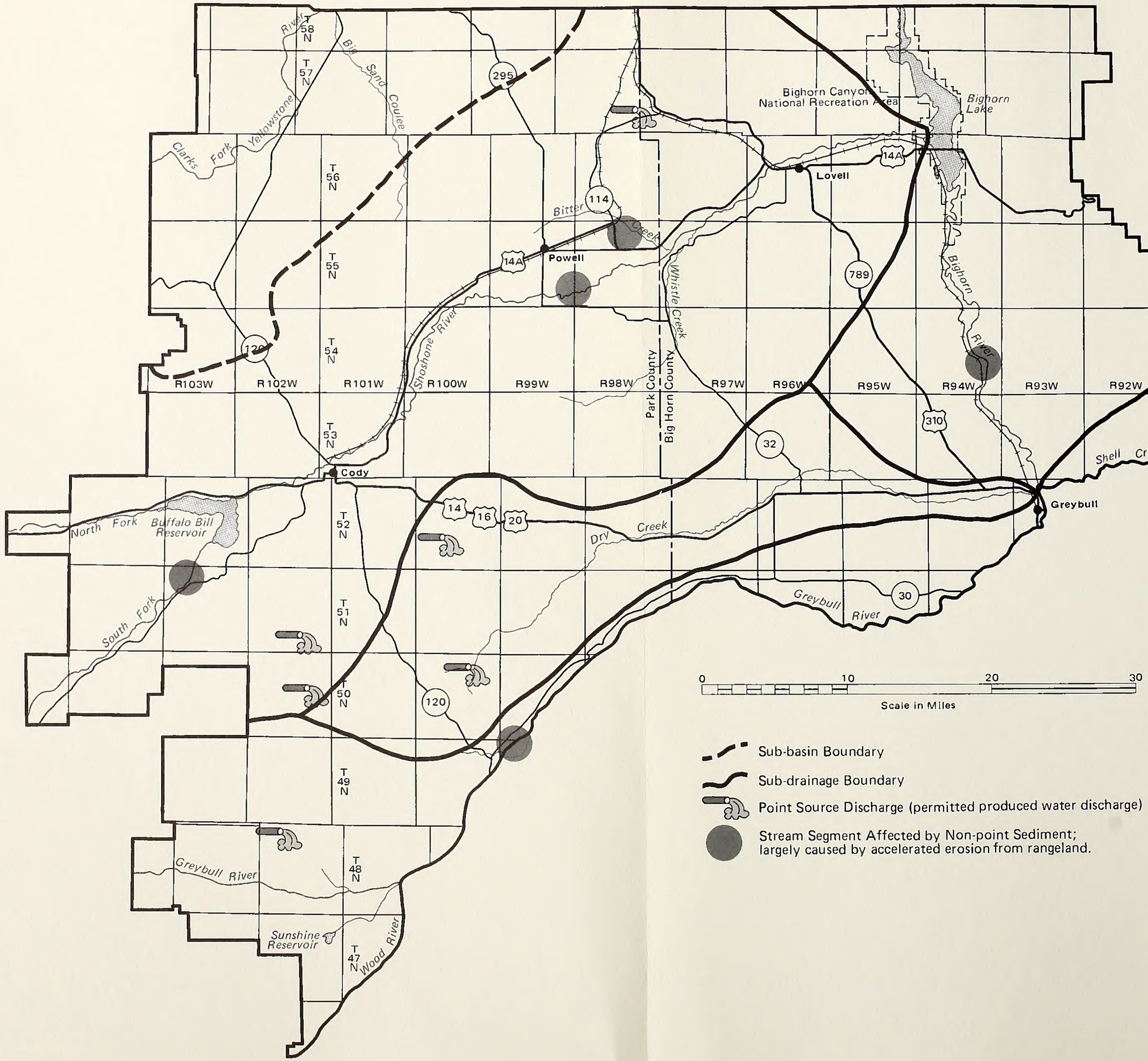
The BLM has constructed watershed treatments for sediment control in the planning area. Existing watershed treatments are listed in table 19.

Accelerated erosion accounts for 65% of the sediment generated in the planning area. Livestock grazing causes 73% of the accelerated erosion; recreation and ORV use, 17%; and all other surface-disturbing activities (such as oil and gas development and timber harvesting), the remaining 10%.

Groundwater

Thirty geologic units underlying the planning area produce sufficient water for various uses. The BLM has developed and maintains 25 wells that reach the Fort Union, Willwood, Mesaverde, and Lance formations. Wells developed in these aquifers usually yield 10 to 15 gallons per minute, with water quality suitable for livestock and wildlife consumption. The BLM has developed one groundwater supply for drinking water purposes at the Five Springs Campground.

The paleozoic aquifers in the Mississippian age Madison Limestone and Tensleep Sandstone are capable of supplying large volumes of water for agricultural or irrigation purposes. However, municipal water use from the Madison Limestone is restricted because dissolved radium exceeds the drinking water standards in some wells near Frannie.



Map 48
Major Drainages and Water Pollution Sources

TABLE 15

MEAN ANNUAL WATER YIELDS, WATERSHED ACREAGES, AND PUBLIC LANDS ASSOCIATED WITH MAJOR TRIBUTARIES OF THE PLANNING AREA

Stream	Water Yield (acre-feet per year)	Watershed Area within Planning Area Boundary (acreage)	Public Lands in Each Drainage (acreage)	Public Lands in Each Drainage (percentage)
Bighorn River Subbasin				
Bighorn River	1,265,900[1]			
Greybull River	158,000	372,000	107,800	29
Dry Creek[2]	23,200	293,700	249,300	85
Shell Creek	104,100	70,300	52,700	75
Bear Creek	14,800	45,400	42,200	93
Porcupine Creek	34,000	35,700	10,400	29
Shoshone River	786,000	951,600	389,800	41
Miscellaneous tributaries	10,000	263,200	112,100	43
Bighorn River Subbasin subtotal	2,396,000	2,031,900	964,200	47 (average)
Clarks Fork of Yellowstone Subbasin				
Clarks Fork/Yellowstone R.	643,900[1]			
Pat O'Hara Creek	14,100	49,000	17,500	36
Big Sand Coulee	3,200	92,900	55,500	60
Silvertip Gulch	1,800	58,800	24,800	42
Miscellaneous tributaries	2,000	50,400	19,000	38
Clarks Fork of Yellowstone Subbasin subtotal	665,000	251,100	116,800	47 (average)
Planning area total	**3,061,000**	**2,283,000**	**1,081,000**	**47 (average)**
Loch Katrine (closed basin)[2]		10,500	9,500	90

[1] This is the amount of water that enters at the planning area boundary.

[2] Loch Katrine acreage figures have been accounted for under Dry Creek values.

TABLE 16

USES AND CLASSIFICATIONS OF SELECTED STREAMS IN THE PLANNING AREA

Stream or Impoundment	Uses[1]	DEQ Classification[2]	WGFD Classification[3]
Bighorn River Subbasin			
Bighorn River (Greybull to Kane)	I, W&L, SBC, CWF	II	3
Shell Creek (below forest boundary)	PWS, I, CWF, W&L	II	3
Bear Creek	W&L	IV	5
Crystal Creek	W&L, CWF	II	3
Crooked Creek	W&L,CWF,SA	II	3
Porcupine Creek	SBC,W&L,CWF,SA	II	3
Trout Creek	SBC,W&L,CWF,SA	II	3
Greybull River and tributaries			
Forest boundary to Wood River	I, W&L, CWF, SBC, SA	II	3
Wood River to Meeteetse Creek	I, W&L, CWF, SBC, SA	II	4
Meeteetse Creek to Bench and Farmers Canal diversions	I, W&L, CWF, SBC	II	4
Canal diversion to mouth	I, W&L	II	4
Dry Creek			
above Wyoming 120	W&L,I	II	4
between Wyoming 120 and U.S. 14	W&L, I	IV	4
from U.S. 14 to mouth	W&L, I	II	4
Oregon Coulee	W&L	IV	5
South Fork Dry Creek	W&L	IV	5
Shoshone River and tributaries			
North Fork, forest boundary to Buffalo Bill	SBC, I, CWF, W&L, SBC,SA	II	2
South Fork, forest boundary to Buffalo Bill	PWS, I, CWF,W&L,SBC,SA	II	3
Buffalo Bill to Corbett Dam	I,CWF,SA,SBC,W&L	II	2
Corbett Dam to Penrose	I,CWF,SBC,W&L	II	2
Penrose to Yellowtail	PWS,I,CWF,SBC,W&L	II	3
Sulfur Creek	I,W&L	II	4
Idaho Creek	W&L	IV	5
Mantua Draw	W&L	IV	5
Bitter Creek	W&L, I	II	3
Whistle Creek	W&L	II	4
Sage Creek (North)	I, W&L	II	3
Polecat Creek	W&L	II	3
Loch Katrine	W&L	IV	-
Clarks Fork of Yellowstone Subbasin			
Silvertip Gulch	W&L	IV	5
Sunlight Creek	W&L	II	2
Big Sand Coulee	I, W&L	IV	5
Impoundments in Big Sand Coulee	CWF,SBC	II	-

[1] CWF = cold water fishery; I = irrigation; IWS = industrial water; PBC = primary body contact; PWS = public water supply; SA = stream aesthetics; SBC = secondary body contact; W&L = wildlife & livestock watering; WWF = warm water fishery

[2] Class I = surface waters that are to be maintained at their existing quality and in which no further water quality degradation by point source discharges will be allowed. Class II = surface waters, other than those classified as class I, that the WGFD has determined to be supporting game fish at present or to have hydrologic and natural water quality potential to support game fish. Class III = surface waters, other than those classified as class I, that the WGFD has determined to be supporting nongame fish at present, or to have the hydrologic and natural water quality potential to support nongame fish. Class IV = surface waters, other than those classified as class I, that the WGFD has determined to not have the hydrologic or natural water quality to support fish.

[3] Class 1 = premium trout waters—fisheries of national importance. Class 2 = very good trout waters—fisheries of statewide importance. Class 3 = important trout waters—fisheries of regional importance. Class 4 = low production waters—fisheries frequently of local importance but generally incapable of sustaining substantial fishing pressure. Class 5 = very low production waters—often incapable of sustaining a fishery.

TABLE 17

SALT AND SEDIMENT LOADINGS OF TRIBUTARY STREAMS IN THE PLANNING AREA (exclusive of irrigated land contributions)

Tributary	Salt Loading (tons per year)		Sediment Loading (tons per year)	
Bighorn River Subbasin				
Dry Creek	67,600		10,800	
Shell Creek	35,300		7,400	
Greybull River	39,800		15,800	
Miscellaneous tributaries	180,000		60,000	
Shoshone River	743,800[1]		262,000[2]	
Bighorn River Subbasin subtotal		1,066,500		356,000
Clarks Fork of Yellowstone Subbasin				
Big Sand Coulee	40,600		10,000	
Miscellaneous tributaries	75,800		44,900	
Clarks Fork of Yellowstone Subbasin subtotal		116,400		54,900
Planning Area Total		**1,182,900**		**410,900**

[1] Of this, 25,000 tons per year come from Whistle Creek.

[2] Of this, 32,100 tons per year come from Whistle Creek.

TABLE 18

ANNUAL PRODUCED WATER VOLUME AND SALT LOADINGS (by receiving drainage)

Receiving Waters	Produced Water (acre-feet per year)		Salt Loadings (tons per year)	
Bighorn Subbasin				
Greybull River				
Rawhide Creek	2,200		8,700	
Miscellaneous tributaries	10		30	
Greybull River subtotal		2,210		8,730
Dry Creek		4,100		27,600
Shoshone River				
Polecat-Sage Creek	150		1,040	
Sage Creek	270		3,000	
Sage Creek South	550		2,500	
Mantua Draw	110		460	
Sulphur Creek	2,700		11,330	
Homer Creek	100		320	
Cottonwood Creek	150		1,050	
Miscellaneous tributaries or Shoshone direct	6,470		24,000	
Shoshone River subtotal		10,500		43,700
Bighorn River Subbasin subtotal		18,110		88,060
Loch Katrine		1,300		8,030
Clarks Fork of Yellowstone Subbasin		1,050		5,200
Planning Area Total		**19,160**		**93,260**

TABLE 19

EXISTING WATERSHED TREATMENTS IN THE PLANNING AREA

Drainage	Treatment Type	Acres Treated
Little Dry Creek	Spreader dikes	480
	Contour furrows	450
Dry Creek (includes Red Point Draw)	Contour furrows	3,200
Big Sand Coulee	Contour furrows	6,250
Miscellaneous tributaries		
to Bighorn River	Spreader dikes	4
to Shoshone River	Contour furrows	1,260

Wetlands

Stream Zones

The Cody planning area contains a total of 584 miles of streams which contain 7,045 acres of typical channel and wetland/riparian habitat. Perennial streams total 213 miles (2,549 acres), and intermittent-ephemeral streams (those with sufficient flowing water that they normally support a zone of riparian vegetation) total 371 miles (4,497 acres). Map 49 shows wetland/riparian habitat that are proposed for active management.

Although perennial streams always have water, both types of streams have similar habitat values. They support a greater diversity and abundance of wildlife species than any other type of area in the Bighorn Basin. Typical intermittent-ephemeral streams are Whistle, Coon, and Deer creeks; Roan Wash; Sand Draw; West Fork Big Sand Coulee; and portions of Bear, Five Springs, and Willow creeks. Streams such as Upper Dry Creek, Oregon Coulee, and Mantua Draw usually flow and support wetland vegetation as a result of water releases from oil fields.

The condition of the stream zones ranges from excellent to poor, and the trend is stable or declining. About 140 miles of perennial stream channels are in a declining trend, and 35 of the 73 stable miles are in poor condition.

One mile of the perennial stream riparian habitat in the planning area is rated as excellent; 35 miles, good; 20 miles, fair; 109 miles, poor; and 47 miles are classified as having low habitat value.

About 75% of the riparian zones along intermittent-ephemeral streams is in unsatisfactory condition. These areas lack a diverse age mixture of cottonwood trees, the predominant vegetation along desert stream zones. The riparian habitat trend along most of these streams is downward because of a lack of cottonwood regeneration, and many of the trees present are decadent and dying. Most of the channels of the intermittent-ephemeral streams also appear to be in poor condition.

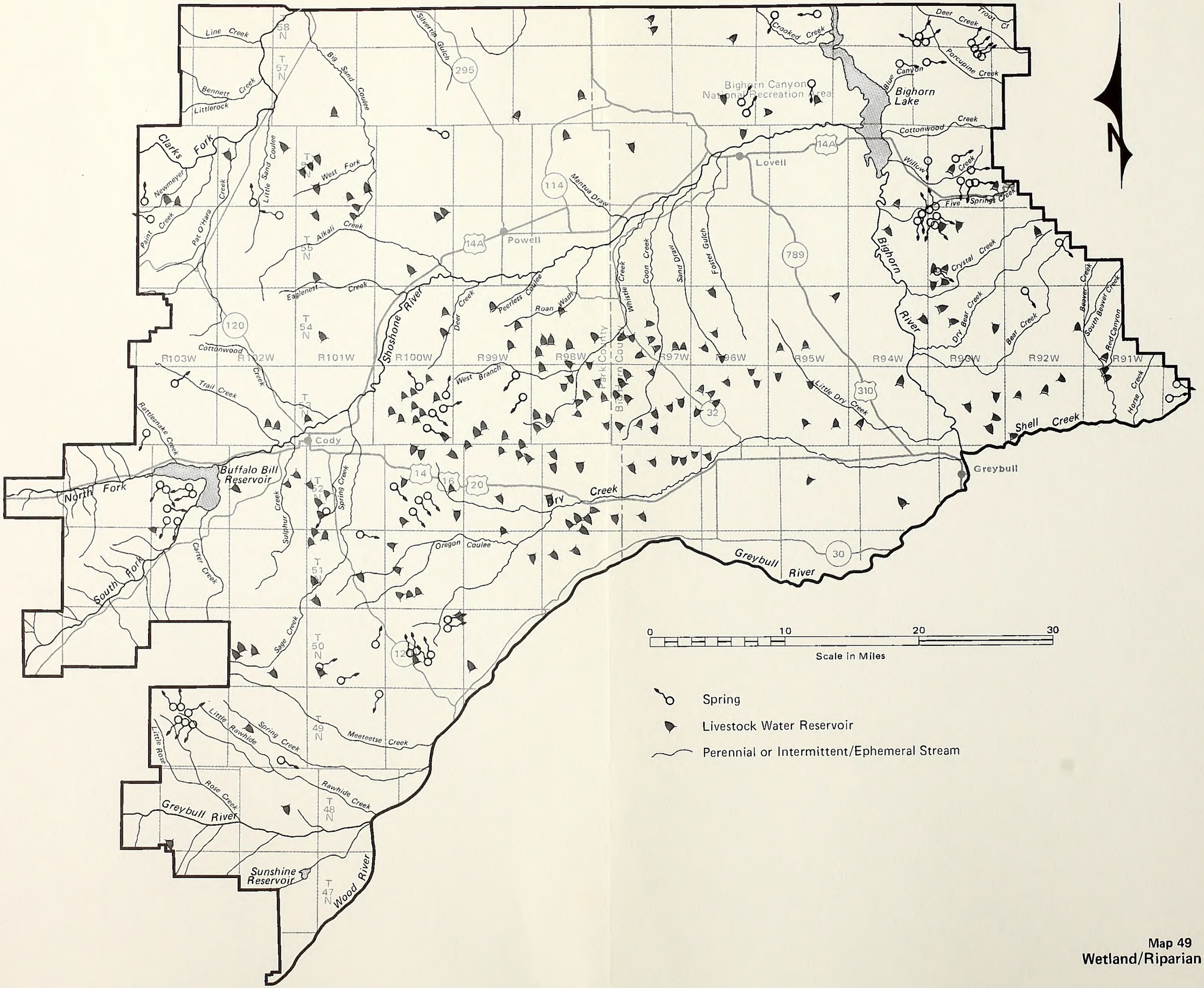
Fencing has been used as a management method on some stream segments. Ten riparian tracts along the Bighorn River, 4 miles of Dry Creek, and 0.3 mile of the South Fork of the Shoshone River are specific examples where fencing has been implemented and the condition and trend of these stream zones are showing improvement.

Reservoirs

A total of 733 small livestock water reservoirs and irrigation reservoirs support an estimated total of 3,665 acres of wetlands ranging from well-vegetated sites with permanent water to barren sites with washed-out dams. About 60% of the sites contain water during a normal precipitation year. Typical vegetation in these areas is cottonwood, willow, tamarisk, roundstem and three-square bulrushes, cattail, sedges, and grasses. Islands built in two reservoirs furnish thickly vegetated sites for use by nesting waterfowl and other wildlife.

The diversity and abundance of wildlife species using reservoir sites is directly related to the reservoir size and to the condition and diversity of the habitat. It appears that more waterfowl are produced at livestock water sites and at small irrigation reservoir sites than in any other wetland habitat type on public land in the planning area.

On some reservoir sites, establishment of wetland-associated plants has produced good



Map 49
Wetland/Riparian Habitat

habitat. On others, habitat development has been minimal because the invading vegetation has been eaten and trampled. More than 50% of the reservoirs have not attained acceptable habitat conditions.

The overall habitat trend of livestock water reservoir sites is static or possibly slightly downward because fewer reservoirs have been built in recent years. The trend is static because reservoirs are generally short-lived, and replacement reservoirs are built when old ones become nonfunctional.

Loch Katrine, a closed basin with fresh, brackish, and saline water wetland areas, is maintained by releases of water from the Oregon Basin oil field. Portions of the lake often go dry when water inflow is reduced.

Spring Areas

The planning area contains at least 80 springs that support about 160 acres of wetlands and about 32 miles of canals with 465 acres of associated wetland habitat. No data have been collected on the condition or trend of these wetland habitat types. Canals and associated wetlands on public land are managed by irrigation districts and individuals under their right-of-way leases.

Wilderness

The planning area contains one wilderness study area (WSA), the McCullough Peaks WSA. Wilderness characteristics are summarized in the current management situation analysis, which is on file at the Worland District office, and in the forthcoming Grass Creek/Cody Wilderness EIS, which will be available in February or March 1988.

Wild Horses

The McCullough Peaks wild horse herd management area is approximately 12 miles east of Cody and extends 15 more miles along U.S. Highway 14-16-20 to form the southern boundary. It is bounded on the north by BOR withdrawn lands that are controlled by the Willwood Irrigation District. McCullough Peaks form the western boundary and Wyoming Highway 32 the eastern boundary.

The herd management area encompasses approximately 110,420 acres, of which 104,200 acres is BLM-managed public land and the rest is scattered parcels of state and private lands. At present the area contains approximately 100 wild horses.

A separate herd formerly occupied the 122,000-acre Foster Gulch area, which is east of Wyoming 32. That herd originated when some horses from the McCullough Peaks herd moved across the highway before a fence line was constructed in the 1960s. About 45 horses remained on the east side after the fence was built, but the herd was later removed for better control and management.

Approximately 15,600 acres of the McCullough Peaks herd management area is a WSA. It is managed in accordance with the BLM's *Interim Management Policy and Guidelines for Lands Under Wilderness Review* (USDI, BLM 1979, 1983). Horses are regularly observed in this area, and their use is considered compatible with the management objectives and values associated with the WSA.

There are four livestock grazing allotments in the McCullough Peaks herd area: Whistle Creek, East-West, Reclamation, and Red Point. Existing boundary and division fences associated with the management of those allotments do not appear to be affecting the movement of the horses, which usually increases during the fall, winter, and early spring. Livestock use in these allotments is authorized during spring, fall, and winter for both cattle and sheep.

The overall appearance and vigor of the wild horses is extremely good. Herd size may fluctuate because of drought or severe winters; on the average the herd size is increasing.

Wildlife and Fish Habitat

Fisheries

The WGFD has identified 149 miles of perennial stream in the planning area as sport fisheries streams: 8 miles in class 1, 20 miles in class 2, 57 miles in class 3, and 64 miles in class 4. These streams contain rainbow, brown, cutthroat, and brook trout; walleye; sauger; catfish; ling; and whitefish. Sixty-four miles of perennial streams are not classified as sport fisheries waters: 35 miles are class 5 and 29 miles are unclassified. Most of these waters contain native nongame species such as longnose dace, flathead chub, mountain sucker, fathead minnow, white sucker, and plains killifish. The nongame species are an important prey base for numerous birds and mammals. The Bighorn, Greybull, and Shoshone rivers support fisheries for trout and cool water game species.

The condition of fisheries habitat varies from natural and pristine in streams like Porcupine and Trout creeks to poor in streams such as Paint and Pat O'Hara creeks. Poor condition is character-

ized by sloughed banks, widened channels, reduced depths, loss of bank vegetation, lowered water tables, and siltation in spawning gravel and food-producing rubble.Channel stability and stream zone condition are unsatisfactory in most places. About 35% of the total stream mileage in the planning area is in good or excellent condition. About 140 miles of perennial streams are in a declining trend, and 35 miles are in stable but poor condition.

Of the 149 miles designated as classes 1 through 4 sport fisheries, 98 miles are in a declining trend and 51 miles stable, but 26 of the 51 stable miles are in poor condition.

Rainbow trout have been stocked in ten of the reservoirs and bullheads in another. Native nongame species have become established in eight reservoirs fed by irrigation water. These species are an important prey base for most of the birds and mammals that use the reservoir.

Siltation is reducing water depth of most reservoirs. About 12 to 15 feet of water is considered necessary to maintain sufficient oxygen to support fish during the period of ice cover in the Bighorn Basin. Lesser depths are adequate if sufficient inflow occurs during the winter; however, since no new reservoirs of sufficient size, depth, and inflow to support sport fisheries have been built in the last 15 years, the reservoir fisheries base is steadily declining.

Wildlife Habitat

Background

The 27 habitat types in the planning area potentially are inhabited by 455 terrestrial wildlife species. Of these, 384 have been documented as existing in the planning area and 245 have been documented as breeding in this area. The nine habitat types listed in table 20 occupy only 5.2% of the planning area, but they provide breeding habitat for 73% of the documented breeding species and are the only verified breeding habitat types for 40% of these species. These habitat types also provide habitat for 85% of the 169 statewide rare or uncommon species and 92% of the 118 species in the planning area that receive state or federal emphasis (federally listed endangered or threatened species or candidates for listing, species listed by the state as in need of special management, or state-protected mammals).

TABLE 20

WILDLIFE HABITAT TYPES OF SPECIAL CONCERN

Habitat Type	Estimated Acreage	Number of Animal Species
Open aquatic-emergent wetland	2,600	157
Willow riparian woodland	9,600	130
Aspen riparian woodland	1,200	146
Cottonwood riparian woodland	3,800	208
Subirrigated grassland	12,200	75
Mountain mahogany shrubland	13,500	89
Douglas-fir forest	9,200	130
Engelmann spruce-subalpine fir forest	2,000	154
Aspen-conifer forest	1,600	139

Threatened or Endangered Species

The only confirmed population of black-footed ferrets in the nation occupied this planning area until recently. In September 1984, 124 ferrets, including 24 litters, were confirmed in the black-footed ferret habitat area. Numbers declined sharply in 1985, however, in part because of canine distemper, and the WGFD removed the last 18 known ferrets. The current status and range of the black-footed ferret in the planning area is unknown.

Black-footed ferrets are closely associated with the prairie dog prey base. The planning area contains 74 white-tailed prairie dog colonies and 2 black-tailed prairie dog colonies covering an estimated 14,000 acres. Approximately 70% of the known prairie dog colonies are on public land.

One pair of bald eagles nested in the planning area in 1982, 1983, and 1984 and produced young in 1982 and 1984. That nest was inactive in 1986. Bald eagles spend the summer on the South Fork of the Shoshone River. This area and the Sho-

shone River east of Cody are the best potential breeding habitat in the planning area. Approximately 5% of the potential nesting habitat is on public land.

Winter bald eagle populations number approximately 20 eagles along the Greybull River and 50 along the Bighorn River. Approximately 25 eagles spend the winter along the Shoshone River, but numbers there are less stable. The trend in wintering populations appears to be stable, but numbers are low. Wintering eagles depend significantly on public land--it is estimated that half the winter food base is on public land. The bald eagle population in the Greater Yellowstone ecosystem is expanding into unoccupied habitat; populations in the planning area may remain close to current levels for the next 10 years, but should increase within the next 50 years.

Peregrine falcon recovery is expected in six locations within the planning area; public land comprises significant portions of five areas and the majority of two areas. The planning area falls within the nesting range of the peregrine falcon, and falcons occur throughout the planning area. However, peregrine falcon observations in the planning area as a whole however, are infrequent, and there is no evidence of breeding.

In addition to the species listed above, BLM personnel evaluated the status of gray wolf, grizzly bear, whooping crane, least tern, and piping plover. These species will not be discussed further because they would not be affected by actions proposed under the alternatives.

Candidate Species for Federal Listing

Mountain plovers breed on public land in the planning area, but the current population level and trend are unknown. At least 60% of available nesting habitat for this species in the planning area is on public land.

A nesting concentration of long-billed curlews in the planning area is one of only two such concentrations known in Wyoming. Curlew populations have decreased statewide since 1940 primarily because of habitat loss. The WGFD defines the curlew as a species in need of special management attention in Wyoming because of a declining and restricted population. Probably 80% of the available nesting habitat in the planning area is on public land.

Four active Swainson's hawk nests are known to be on public land in the planning area. The Swainson's hawk is a typical summer resident and migrant. This species is considered common in Wyoming and the population trend appears to be stable.

Ferruginous hawks are known to inhabit the planning area, but no nests have been confirmed. Only five ferruginous hawk nests have been known to exist in the Bighorn Basin in recent years. The WGFD has defined the ferruginous hawk as a species in need of special management attention in Wyoming because of unknown status and trend.

Waterfowl and Water Birds

The Yellowtail wildlife habitat management unit is one of the two most important duck-producing areas in central Wyoming. Additional production occurs along the Bighorn, Clarks Fork, Greybull, and Shoshone rivers and in the associated palustrine habitats. Grain, hay, and pasturelands near water are used for brood rearing and provide year-long foraging habitat. The Bighorn and Shoshone rivers and open waters close to grain fields are the main wintering areas. However, the planning area is most important to waterfowl as a fall staging area rather than as production area. Although waterfowl depend on public land habitats for production, most of the available habitat is on private land.

One nesting colony of double-crested cormorants is found on private land in the planning area. The level of dependency on public land in the planning areas appears to be low, but some birds could winter on public land tracts along the Bighorn River.

There are eight great blue heron nesting colonies in the planning area, but none are on public land. The statewide trend of this species is unknown. Compared to the rest of Wyoming, the planning area has few colonies, and the colonies are not large.

The Bighorn Lake area and the Greybull River Valley are major sandhill crane production areas. Other breeding areas are in the Bighorn Mountain drainages and along the Bighorn and Shoshone rivers; occurrences on public lands are significant. Although nonbreeding subadults use these areas from late spring through summer, they are more important as habitat for nesting and brood rearing. One secondary crane fall premigration staging and roosting area has been identified in the planning area. This area is used in most years by 70 to 100 birds. Crane numbers on primary staging areas have increased statewide since 1982; the population of the Rocky Mountain area is increasing.

Raptors

A total of 186 raptor nests are known to exist in the planning area, of which 87 are active. Of the known raptor nests in the planning area, 87% are on public land.

Two Cooper's hawk nests and one goshawk nest have been verified in the planning area, all on public land. The sharp-shinned hawk is a potential breeder. Accipiters such as these species nest in trees. The goshawk selects old-growth and mature conifer stands; the Cooper's hawk selects either conifer or deciduous stands, woodlands, and river groves; and the sharp-shinned hawk prefers dense stands of second-growth timber and thickets. Current populations appear to be stable, although deterioration of forest habitats could affect long-term production. The accipiters also are relatively late nesting raptors whose young may not fledge until mid-August.

Osprey are potential breeders in the planning area. They inhabit river and lake areas and nest on the tops of snags or stone pinnacles near water. Surveys of nesting ospreys conducted by the WGFD indicate an increasing population and an adequate production statewide. Ospreys also nest until mid-August.

The merlin is a potential breeder that also nests until mid-August. The WGFD has classified the merlin as a species in need of special management attention in Wyoming because of a declining or restricted population. Except for the bald eagle and the peregrine falcon, the merlin has been assigned the highest priority of any Wyoming raptor for future study.

Eight burrowing owl nests have been verified in the planning area, all on public land. Burrowing owls usually are associated with rodent colonies since they nest underground in burrows. The WGFD has classified the burrowing owl as a species in need of special management attention in Wyoming because of habitat loss and unknown population status and trend.

The saw-whet owl (one nest) and the screech owl (two nests) are verified breeders in the planning area. The area also falls within the breeding range of the flammulated owl and pygmy-owl and is on the edge of the breeding range of the hawk-owl. The small owls nest in tree cavities in a variety of pine, fir, and mixed forest types, as well as in scattered woodlands. Because inventory work in forest communities has been limited, the current population of these species is unknown. All known nests are on public land.

The great horned owl (19 nests) and long-eared owl (1 nest) are documented breeders in the planning area. The great gray owl and short-eared owl are potential breeders. The large owls select a variety of habitat types, preferring forest, woodland, riparian woodland and shrubland, or wetland habitats; therefore, they would be affected by forest habitat conditions. The current status of each of these species is unknown.

Grouse

Eighty-six sage grouse strutting grounds have been identified in the planning area, of which 77 were checked in the past four years and 60 have been documented as active in the past five years. Sage grouse occur in significant and apparently stable numbers in suitable habitat throughout the planning area; 86% of known strutting grounds are on public land. However, the population appears to have declined during the past 30 years.

Sharp-tailed grouse have been observed on the west slope of the Bighorn Mountains and near Bighorn Lake. The population appears to be small. No dancing grounds have been identified.

Big Game Ungulates

Bighorn sheep, elk, moose, mule deer, pronghorn antelope, and Rocky Mountain goat are found in the planning area. The 1984 post-season population estimates for herd units of all these species but the mountain goat are shown in table 21, as are population trends and the WGFD objectives for each herd unit. Table 22 lists acreages of crucial winter range and parturition ranges and the populations on crucial winter ranges for bighorn sheep, elk, mule deer, and Rocky Mountain goat. No crucial winter ranges for pronghorn have been identified in the planning area.

Pronghorn herd numbers in the Carter Mountain unit were reduced partially because of a severe snowstorm in April 1984 that caused a large die-off in hunt area 82. It was estimated that about 60% of the herd was lost in that storm.

Approximately 64,800 acres of elk crucial winter range (41% of the total) and 46,900 acres of elk calving range (44% of the total) are on public land. Although recent harvests have been light, winter trend counts, which are considered accurate for this area, show a decreasing population. This probably is the result of winter distribution changes.

Approximately 103,000 acres of mule deer crucial winter range in the planning area (23% of

TABLE 21

BIG GAME POPULATIONS BY HERD UNIT

Species and Herd Units	1984 Post-season Population Estimate	WGFD Population Objective	Population Trend
Pronghorn			
Badger Basin	650	650	Stable
Carter Mountain	4,430	7,000	Decreasing
Crystal Creek	58	160	Increasing
Total	**5,138**	**7,810**	
Elk			
Carter Mountain	2,400	2,000	Increasing
Clarks Fork	3,000	3,000	Stable
Gooseberry	1,770	1,800	Stable
Horse Creek	660	500	Decreasing
Northeast Bighorn	2,450	2,500	Stable
North Fork Shoshone	2,400	2,400	Stable
Total	**12,680**	**12,200**	
Mule Deer			
Clarks Fork	4,000	6,000	Increasing
Devils Canyon	3,300	3,000	Increasing
Greybull River	3,000	3,000	Increasing
Horse Creek	3,050	3,000	Increasing
Meeteetse	4,530	7,300	Increasing
North Fork Shoshone	1,400	2,500	Increasing
Shoshone River	3,600	3,000	Increasing
South Fork Shoshone	4,800	4,800	Increasing
Total	**27,680**	**32,600**	
Moose			
Crandall	100	100	Stable
Greybull-Gooseberry	40	115	Static
North Fork Shoshone	75	75	Stable
South Fork Shoshone	75	75	Stable
Sunlight	65	75	Stable
Total	**355**	**440**	
Bighorn Sheep			
Clarks Fork	500	500	Stable
Francs Peak	1,000	1,000	Stable
Trout Peak	450	440	Stable
Wapiti Ridge	880	880	Stable
Total	**2,830**	**2,820**	

the total) is on public land. Overall, populations in the planning area appear to be stable to slightly increasing. In general, there appears to be a low level population increase in the planning area, and range appears to be expanding into the Heart Mountain area.

Moose are widely scattered in five herd units. In the Greybull-Gooseberry herd unit, the population has increased slightly, but the overall population trend is generally stable.

Approximately 18,000 acres of bighorn sheep crucial winter range in the planning area (35% of the total) is on public land.

In addition to the species named above, The lynx, wolverine, spotted bat, white-faced ibis, and Wyoming cave snail are found in the planning area. The swift fox does not occur in the planning area, but it is expected that its range could expand to include the planning area within the next 20 years.

TABLE 22

BIG GAME POPULATIONS ON CRUCIAL WINTER RANGE AND PARTURITION RANGE

Species	Estimated Population in Planning Area	Crucial Winter Range in Planning Area		Parturition Range in Planning Area[2]	
		Acreage in Planning Area[1]	Percentage on Public Land	Acreage in Planning Area	Percentage on Public Land
Mule deer	14,000	451,000	23		
Elk	3,500	160,000	41	107,000	44
Bighorn sheep	500	52,000	35		
Rocky Mountain goat	35	2,000	89		

[1] Figures indicate crucial winter range on all lands in the planning area, state-owned and private lands as wll as public land.

[2] Separate parturition areas have not been delineated in this planning area for species other than elk.

SOCIOECONOMIC CONDITIONS

Area and Population

The Cody Resource Area includes roughly half of Big Horn County and most of Park County. The largest communities are Cody, Greybull, Powell, Lovell, Basin, and Meeteetse. In addition, there are smaller communities that provide limited services to residents and visitors. Worland and Thermopolis to the south also are available trading and service centers. Unless otherwise indicated, the socioeconomic analysis will concentrate on Big Horn and Park counties.

The 1986 population was estimated to be 22,566 in Park County and 11,160 in Big Horn County, for a combined area total of 33,726. This was slightly under the 1985 total because of a small population decline in Big Horn County. On average, Park County had about 4.3 persons per square mile and Big Horn, 3.5.

The state of Wyoming projects that area population in the next 20 years will increase between 14% and 15%. This estimate is based on present economic expectations for the area.

Economic Conditions

From an employment perspective, the leading economic sectors in the Cody Resource Area are government, agriculture, services, retail, and mining. Relative to total output value, the leading sectors are minerals (especially oil and gas), government, wholesale and retail, agriculture, construction, and manufacturing. Leading income-producing sectors in 1983 were government, mining, services, manufacturing, construction, retail and public utilities-transportation.

Big Horn and Park counties jointly export approximately $1 billion worth of products and services annually. Park County accounts for about 75% of the total output. The leading exports are oil and gas products, other minerals, manufactured goods, and cattle. The latest figures from the state of Wyoming's input-output model indicate that mineral exports are more than $753 million per year; manufactured goods, approximately $66 million; and cattle, about $60 million. Exports of all agricultural products total between $84 and $85 million annually.

The state of Wyoming's input-output model indicates the values of annual imports to the two counties are approximately $560 million. This indicates that these counties jointly export about twice as much as they import, resulting in an area trade surplus. The leading importing sectors are retail, wholesale, minerals, manufacturing, government, and households.

The combined property valuation for Park and Big Horn counties in 1985 was about $769.7 million, or about 3.2% below that of 1984 and almost 13% below 1983 values. Park County, which comprises the major portion of the resource area, experienced valuation declines in oil and miscellaneous minerals, public utilities, telephone and telegraph, and industrial plants and equipment. Oil property alone decreased by roughly $40 million. By comparison, property values rose almost 3.4% in Big Horn County. Increases occurred in land values, minerals other than natural gas, railroads, and business and commercial property. In Big Horn County, property values declined for public utilities, personal property, and industrial plants and equipment.

Taxes in 1985 totaled slightly more than $51 million, with between 20% and 25% received from sales and use taxes. In the same year, area bank deposits amounted to almost $345 million. In fiscal year 1984, area entitlements from revenue sharing funds reached $1 million. Annual entitlement levels have varied noticeably since fiscal year 1978.

Employment

The average annual area labor force reached 19,547 in 1984. Between 1970 and 1984, area employment rose by slightly less than the labor force to a total of 18,522. Area unemployment in 1984 averaged 5.2%. Big Horn County had a higher unemployment rate (6.4%) in 1984 than Park County (4.8%). Preliminary estimates in March 1986 placed the unemployment rate at 15.3% in Big Horn County and 12.1% in Park County.

The unemployment rate has varied substantially over the decade prior to 1984, with 1981 exhibiting the lowest area levels and the years between 1981 and 1986 showing much higher rates than the rest of the decade. The high rates reflect the impacts on the local economy of nationwide energy-related economic fluctuations.

Total personal income in Park County rose 127% between 1976 and 1984, to more than $300 million. Big Horn County's income was up about 100%, to almost $114 million. The combined average increase for the two-county area of 119% compares to a state increase for the same period of 133%.

Average per capita income rose to $12,200 in Park County by 1984, or approximately 81% more than the 1976 level. During the same period, there was about an 81% increase in Big Horn County, to $9,132.

Virtually all of the 1984 personal income was from nonfarm sources. In fact, farm income in Big Horn County registered more than a $3 million deficit in 1984, while Park County farm income was positive by about $2.2 million that year. About 56% of total personal income in the Cody Resource Area in 1984 came from wages and salaries. Nearly one-seventh of 1984 personal income came from transfer payments, while dividends, interest, and rent accounted for most of the remainder.

The earnings portion of 1984 income totaled about $262 million, of which the government sector (with 25%) was the largest singular source. The mining sector, the second major source of earnings, accounted for approximately 16% of the total.

Major Industries

Agriculture

Characteristics

Land in farms in Big Horn and Park counties, jointly, totaled about 1,547 thousand acres in 1982, about 5% less than had been reported in 1974. Park County accounted for 70% of the farmland, and the two-county total represented less than 5% of total Wyoming farmland.

Approximately 7% of area farms contained 2,000 or more acres. However, about 75% of the area farms contained fewer than 500 acres. Farming was the chief occupation of approximately 90% of all area farm operators in 1982, with most operators residing on the farm they operated. Family or individually operated farms represented about 80% of all area farms in 1982. In that year, hired laborers numbered between 2,500 and 2,600, with a corresponding payroll of more than $5.7 million. Park County accounted for between 60% and 70% of these worker-payroll totals.

According to the 1982 U. S. Census of Agriculture (U. S. Dept. of Com. 1982), area cropland totaled about 260 thousand acres. Of the two counties, Park reported slightly more cropland. However, neither county harvested crops from more than 75% of its available cropland that year.

Crops

The major crops in the Cody Resource Area are grains and hay. Dry beans and sugar beets also are produced. In 1984, the area produced 206 thousand bushels of wheat, approximately 5 million bushels of barley, about 581 thousand bushels of oats, and 912 thousand bushels of corn. Hay production was just under 200 thousand tons in 1984, and dry beans totaled about 372,250 hundredweight. About 374 thousand tons of sugar beets were produced in 1983 (about 60% of the state total). The resource area produces about 40% to 50% of the state's barley and dry beans and about one-fifth of its oats and corn. It produces less than 10% of the state's total output of hay and wheat.

Livestock Production

Livestock production is the single most important agricultural activity in the resource area. Livestock populations on area farms in 1985 were 132,000 head of cattle and 56,000 sheep. The 1982 Census of Agriculture (U. S. Dept. of Com. 1982) indicates that these farms also had between 5,000 and 6,000 head of horses and ponies and about an equal number of hogs. On average, the area contains about one-tenth of the state's combined total of cattle, sheep, hogs, horses, and ponies.

Cattle production has declined an average of 11% since 1981 and sheep production, 33%. This has been influenced by increases in operating costs, adverse weather conditions, and market fluctuations.

Since 1983, approximately 42 transfers of grazing permits involving the sale or loss of base properties have been processed by the Cody Resource Area office. The demand for public forage and, subsequently, for grazing permits is influenced by the profitability of livestock production.

Approximately one-third of the total area AUM needs are supplied by BLM-managed lands. These lands provide about 90,895 AUMs of allowable use, with 66,976 AUMs allocated to cattle, 23,017 AUMs to sheep, and 902 AUMs to horses. Over the past five years, actual use has averaged 77,896 AUMs annually. The BLM's present grazing fee is $1.35 per AUM. The average annual return to BLM from this fee is about $107,066. The demand for public range is relatively high. Operating costs are increased by the cost of constructing and maintaining projects, fences, or water developments on public lands.

The sizes of many individual ranching units are proportional to their dependency on public

domain. Consequently, the value of rented AUMs depends upon the size and location of the given operation. In 1982, estimated AUM value per head for local livestock operations ranged between $4 and $9 for federally managed AUMs and from $3 to more than $18 for privately leased pasture. Generally, the larger the ranching operation, the greater the economic value placed on individual grazing privileges associated with these public lands.

Table 23 illustrates the percentage of livestock forage obtained from public lands in relation to their operational requirements. The demand for, and dependency on, public rangeland relates to more than just the number of AUMs obtained from the use of public land. The season of use also is important; it corresponds to the time an operator requires public forage to sustain a viable year-round unit in relation to his or her base properties. Spring grazing generally is in great demand because of the lack of available winter feeds. The earlier an individual can turn out his or her livestock on public range, the less dry lot feed the operator must purchase to support the annual livestock operation.

TABLE 23

PERCENTAGE OF LIVESTOCK FORAGE OBTAINED FROM PUBLIC LANDS

Percentage of Forage Obtained from Public Land	Number of Operators	Percentage of Total Operators
0-10%	80	54
11-20%	28	19
21-30%	16	11
31-40%	17	11
41-50%	3	2
+50%	4	3
Total	**148**	**100**

Source: BLM Range Management Automated System (RMAS), Cody Resource Area.

Grazing on BLM-managed lands averages about 8.5 months per year per user, although grazing occurs year-round at various seasonal locations in the planning area.

Revenues

Jointly, Big Horn and Park counties produce agricultural products valued at roughly $110.5 million, according to the state of Wyoming's 1984-1986 input/output interindustry model for these two counties. About three-fifths of this total is the result of cattle sales, while sheep accounted for approximately 2% of the total. Most of the remaining total agricultural value is attributed to grain and hay products. About 70% of total area agricultural output revenue and exports is attributed to Park County. Agricultural exports account for approximately three-fourths of the two-county area's total agricultural sales.

According to the state of Wyoming, agricultural employment totaled roughly 2,200 in 1985. It is estimated that about 1,500 of these workers were employed directly by the livestock industry.

Forestry

Revenues

The combined forestry output for Park and Big Horn counties in the 1984-85 period was valued at between $754,000 to $755,000. Almost 100% of this amount is attributed to exports of Big Horn County output.

The total volume of sawlogs harvested from BLM-administered public lands in the Cody Resource Area varies from year to year with the demand for lumber. Over the past 20 years, the average annual amount of sawtimber harvested from public lands was about 250 thousand board feet (MBF), but under the current management plan, harvests in the resource area in recent years have risen to 500 MBF. Most of the timber is lodgepole pine; some spruce and Douglas-fir also are harvested. Recent prices for such timber have ranged between $10 and $20 per MBF. This translates into approximately $5,000 to $10,000 annually in direct output revenue from BLM stumpage sales.

Most, if not all, of the sawtimber sold in the resource area by the BLM is milled by Cody Lumber, Inc., the only major local buyer for sawtimber. The BLM stumpage sales represent about 5% of the total timber processed by this Cody mill and about 5% of all sawtimber harvested in the resource area. The remainder of the area sawtimber harvest is supplied by the Forest Service, state lands, and private holdings. The Forest Service is the primary supplier of sawtimber, but when that agency is unable to meet the local demand for sawtimber, timber from BLM-administered public land has been used to fill this need.

Fuelwood is the primary timber product being harvested from BLM-administered public land in the resource area. It comprises about 75% of the total timber harvest, with sawlogs making up the

remainder. Present management plans call for continuing these harvest patterns over time.

The market for resource area fuelwood has been very strong for the past ten years. Sales currently range between 1,500 and 2,000 cords per year, with a price of $5 per cord. This translates into $7,500 to $10,000 per year from BLM fuelwood sales. When fuelwood returns are added to the returns from stumpage from BLM-administered lands, the direct annual revenue from BLM timber sales equals between $12,500 and $20,000. This represents 1% to 3% of the total direct output revenues from the resource area's forestry sector.

The resource area forestry sector is responsible for about $1.7 million in total area output revenue (direct plus indirect plus induced). Of this total, BLM-administered lands account for about 1% to 3%.

Employment and Personal Income

The resource area forestry sector provides direct fulltime employment for at least 30 workers. However, timber harvesting on BLM-administered public lands supports less than one work-year equivalent of direct employment. If indirect and induced employment related to timber activities are added to direct employment, the total annual employment attributable to the area's forestry sector rises to roughly 35 workers, but the BLM portion is still less than one work-year annually.

It is estimated that direct personal income derived from the local forestry sector totals slightly more than $380,000 per year, with $6,000 to $10,000 related to harvesting on BLM-administered land. When indirect and induced effects are considered, income related to the forestry sector rises to more than $472,000 per year, and BLM's contribution from timber harvesting increases to between $7,000 and $13,000.

Minerals

Output and Revenues

Overall. In 1986, roughly one-tenth of the total assessed value of Wyoming's mineral production was accounted for by the combined output (about $600.54 million) of Big Horn and Park counties. All but about 1% of this 1986 output came from Park County.

Oil and Gas Output. According to 1984 production figures (Wyo. Dept. of Admin. and Fiscal Control 1985a) Bighorn and Park counties jointly accounted for slightly more than one-fifth of Wyoming's total oil production and about 2% of its gas production.

Federal, state, and fee well output at 23.2 million barrels in the Cody Resource Area in 1984 accounted for about 90% of the area's total annual oil output that year. It is reported that annual oil production from BLM-administered mineral estate in the area totaled about 22.5 million barrels between September 19, 1985, and August 1986. Estimates place 1987 output at about 21 million barrels.

There were 1,074 producing oil wells and 438 water-injection oil wells on September 30, 1986. By January of 1987, production wells had dropped to 1,051 and water-injection wells had risen to 446. Because of lower oil prices prior to January 1987, roughly 129 oil wells were shut-in as of that date. The average price per barrel of oil indicated for the Cody Resource Area was $12.50 for federally administered oil in the 1985-86 period.

The combined total taxable gas output in Park and Big Horn counties was reported to be roughly 8.6 billion cubic feet in 1984. This is roughly a 39% decline below the 1980 output. The area's relative importance as a contributor to total state taxable oil and gas output declined from 4% in 1980 to 2% by 1984. From September 1985 through August 1986, the total output of federally owned gas in the Cody Resource Area totaled more than 8.1 billion cubic feet. On September 30, 1986, there were 31 producing gas wells, but by January 29, 1987, the number had dropped to 28. A total of 270 oil and gas wells were in various stages of abandonment by January 1987, and because of lower gas prices, there were 25 shut-in gas wells. The average price per MCF of produced gas in the resource area was between $2.38 and $3.17.

Coal and Other Minerals Output. State publications report no coal production for the Cody Resource Area. However, about 364,200 tons of sand and gravel, 815,400 tons of bentonite, and about 348,200 tons gypsum were produced in the Cody Resource Area in 1985. Roughly 40% of the sand and gravel, 80% of the bentonite, and much of the gypsum was extracted from BLM-administered lands or other public lands.

Oil and Gas Revenues. The assessed value of joint Big Horn County and Park County 1984 taxable

oil production was roughly $604 million, with about four-fifths attributed to Park County. The value of 1985 oil output declined to about $576 million, with Park County still accounting for about four-fifths. The state of Wyoming assesses minerals at 100% percent of their market value.

The joint county 1984 taxable natural gas production was assessed at almost $27 million. The 1985 output was valued at roughly $19 million. About four-fifths of output was supplied by Park County in both years.

When the indirect and induced effects of oil and gas activity are included, area business activity in 1984 increased by between $750 and $800 million as the result of oil and gas activity that year. By 1985, annual impacts to area business activity had declined to between $700 and $750 million.

Other Mineral Revenues. The assessed value for other minerals produced in 1984 and 1985 was about $5 million in both years. This translates into related total area business activity of between $9 million and $9.5 million each year.

Personal Income

Oil and Gas. Total mineral activities in the two-county area were reported to have provided about $42 million in income in 1984. This was down about 8% from 1980 (Wyo. Dept. of Admin. and Fiscal Control 1986a). Between 75% and 80% of the 1984 joint total was realized by Park County. The state of Wyoming input-output model aggregation of the two counties indicates that by 1985 the direct income to households from the oil and gas sector was about $34 million. It is estimated that the resulting total impacts on area income from oil and gas activity would have been about $58 million in 1985, down from the $71 million of 1984.

Other Minerals. Direct 1985 income from miscellaneous mineral activities in the area is estimated at about $3 million. When indirect and induced effects are included, the impact of area miscellaneous minerals on personal income totals between $5 and $6 million.

Employment

The minerals sector reportedly provided about 1,618 jobs in 1984. This was down almost one-fifth from 1980 (Wyo. Dept. of Admin. and Fiscal Control 1986a). However, on the basis of reported sector output, it is estimated that direct minerals sector jobs in the two counties in 1985 had dropped to not more than 1,400 jobs annually. By 1986, these were estimated to have declined even farther. When indirect and induced jobs are included with direct jobs in 1985, area jobs supported by mineral activities amounted to about 4,300 to 4,400, down about 13% from 1984.

Oil and Gas. It is estimated that the oil and gas sector provided between 1,200 and 1,300 direct jobs for the area in 1985, which translates into total area oil and gas-supported employment of between 3,900 and 4,000 jobs. By 1986 these job levels are estimated to have declined slightly.

Other Minerals. It is estimated that other mineral activities in the resource area provided direct employment to not more than 150 workers in 1984 and 1985. When direct is combined with indirect and induced employment related to miscellaneous minerals production, the figure is slightly less than 450 positions.

Recreation

Revenues

Park and Big Horn counties jointly provided more than a million visitor days of recreation in 1985. Recreational activity in the resource area resulted in more than $31 million in direct revenues. BLM-administered public lands in this area accounted for about 16% of the recreation values in the resource area.

Hunting and fishing represented about 25% of the total area recreation days and provided about 46% of the related direct revenues. Nonconsumptive recreation (such as boating-canoeing, camping, hiking, picnicking, sightseeing, four-wheeling, snowmobiling, skiing, and caving) accounted for the remainder.

BLM-administered public lands provided 31,000 hunting and 50,000 fishing visitor days in 1985. This resulted in approximately $3.7 million of direct sales revenue. These lands also provided about 135,650 visitor days of nonconsumptive recreation valued at approximately $1.5 million. Sightseeing was the leading nonconsumptive recreational activity both on BLM-administered land and on the total lands in the resource area.

When indirect and induced effects of area recreational activities are considered, recreation adds $60 million to total output revenues. Recreation on BLM-administered public lands accounted for only about one-tenth of the total.

Employment and Personal Income

Direct employment related to area recreation totaled about 527 workers in 1985, with activities on BLM-administered lands supporting about 16%. Total employment (direct, indirect, and induced) supported by recreation was estimated at 769 workers in 1985, with activities on BLM-administered lands supporting about 16% of these.

Recreational activities in the resource area produced between $6 and $7 million in direct area personal income in 1985. Activities on BLM-administered public lands are credited with about 16% of that income. When indirect and induced effects are considered, area recreation raises total area income by more than $10 million annually. Activities associated with BLM-administered lands accounted for about $1.7 million.

4 ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The environmental consequences that would be expected to occur under each alternative are described in this chapter, as are the cumulative impacts of the management actions for each alternative. Also described for each alternative are the recommended measures to mitigate adverse impacts, unavoidable adverse impacts, short-term uses versus the long-term productivity of the resources, and irreversible and irretrievable commitment of resources. Whenever possible, the significance of impacts is indicated.

Wilderness is not discussed because wilderness study areas will be covered by the wilderness EIS for Grass Creek and Cody resource areas (USDI, BLM forthcoming).

Management actions and the anticipated levels of activity for specific resource programs are included in tables 2 and 4 in chapter 2. These present a comparison of the alternatives. Tables 5 and 6, also in chapter 2, present comparative summaries of the impacts of each alternative.

ALTERNATIVE A

Introduction

Under Alternative A, current management would be continued on the basis of existing land use plans. Management actions for Alternative A are described in chapter 2.

Effects on Resources

Air Quality

Air quality would be affected by wildfire and fire control activities, timber harvest activities, mineral exploration and development, ORV use, and wildlife development. Pollutants caused by these activities would be either particulates or gaseous emissions. Particulate emissions in the form of fugitive dust would be caused by construction of roads, drill pads, and pipelines, and by other construction activities. Wildfires and prescribed burning would release other particulates into the atmosphere. Suspended particulate concentrations from these activities would cause only temporary, acceptable effects on air quality.

Oil and gas production activities would release gaseous pollutants such as carbon monoxide, hydrocarbons, nitrogen oxides, sulphur oxides, and hydrogen sulfide. These air pollutants would be released by separation facilities, disposal of liquid waste and unwanted gas, burning of waste petroleum products, routine emission of objectionable odors, and venting of noxious vapors from storage tanks. Emissions of these gases would remain within state of Wyoming air quality standards.

There would be no effects on air quality from management actions in any of the proposed ACECs under Alternative A.

Cultural Resources

Because of the procedures for inventory and protection of cultural resources, no adverse effects on cultural resources would be anticipated from surface-disturbing activities except those related to exploration for and development of locatable minerals.

Opportunities for protecting cultural resources from the effects of locatable minerals activities are limited. Limitations on such activities afford less protection than restrictions on other surface-disturbing activities.

When locatable mineral development would disturb 5 acres or less per year, the time allowed for cultural resource inventories is shorter than that allowed for activities that would disturb more than

5 acres per year. For disturbances of the larger area, a plan of operations is required and more time is allowed for cultural resource inventories. The longer time and the requirement for compliance with section 106 of the National Historic Preservation Act would result in protection of a greater number of resources that could be affected by the activities. Activities disturbing less than 5 acres would potentially result in more impacts because of shorter times for review and the lower probability that cultural resources could be protected.

Effects on cultural resources from locatable mineral development generally would be proportionate to the acreage available for development and the level of activity.

The present level of unintentional damage to cultural resources would continue in all proposed ACECs under Alternative A. This would be caused primarily by unrestricted ORV use. These effects would potentially be greatest in the Little Mountain proposed ACEC.

In the Chapman Bench proposed ACEC and in the Five Springs Falls area, closure to locatable minerals activities would provide additional protection for cultural resources. A closure (withdrawal) would allow removal of any existing mining claims that did not meet the requirements of validity under the general mining laws. This could become important if existing mining claims began to affect significant cultural resources.

In all proposed ACECs, full suppression of wildfire and use of heavy equipment could cause unintentional damage to cultural resources. In the Sheep Mountain Anticline area, the lack of an ACEC designation in Alternative A would give cultural resources less protection under regulations relating to mining claim development because a plan of operations would not be required for all activities.

Forestlands

Under Alternative A, the present level of timber harvest would continue to improve diversity in the age and size class structure of timber stands. The loss of timber to natural mortality, fire, and disease would be gradually reduced by 40 to 50%. About 2,200 acres of the timber production base would be managed on a 160-year rotation period to provide enough overmature stands to meet various resource needs.

The 2,700 acres of forestland that is not in the timber production base would be left for natural succession to occur. This would mean that approximately 20% of the total forestland would be in an overmature, decadent condition at any given time. Eventually disease, fire, or other factors would cause overmature stands to revert to earlier successional stages. As these stands reverted to younger stages, other stands would be moving into older age classes to take their place. This would ensure that enough overmature timber would be available to meet various resource objectives.

The productivity of the 5,700 acres of the timber production base to be managed on a 120-year rotation period would increase by 80 to 100% because of intensive management practices such as thinning. Stands that now produce 8 to 10 MBF per acre would produce 15 to 20 MBF during the next rotation period. About 60 million board feet (MMBF) would be available for harvest from these stands over the rotation period of 120 years.

The 2,000 acres of the timber production base that would be managed on a 160-year rotation period would be primarily Douglas-fir and spruce-fir stands. The practice of holding this timber for a longer period would mean that 8 to 10 MMBF less could be harvested than if the stand was harvested at the end of 12 years. This would be an average yearly loss of about 100 MBF.

A seasonal restriction to protect peregrine falcon recovery areas would affect about 1,500 acres of the Rattlesnake Mountain Forest Management plan area, including about 500 acres of forestland. These restrictions would apply to timber harvest activities but not to use or development of access for forest management. At present the only action planned on the 500 acres of affected forestland is sale of fuelwood. It is expected that the seasonal restriction would have no effects on forest management activities.

There would be no effects on forestland resources from management actions in any of the proposed ACECs under Alternative A.

Geology and Minerals

Oil and gas production would continue to decline under Alternative A as existing fields became depleted. This is occurring now in four of the five "giant" fields in the planning area: Elk Basin, Byron, Garland, and Oregon Basin. (A field referred to as a "giant" field is one with cumulative production of more than 100 million barrels of oil.) It is estimated that the ultimate recovery from fields discovered since the late 1970s will be less than 1 million barrels of oil for each field.

During 1986, 162 stripper wells (137 oil wells and 25 gas wells) were shut in because their operation was not profitable. As wells are shut in and

the use of water injection wells and water floods increases, the amount of produced water that is discharged declines, thereby reducing surface water supplies.

Environmental accidents that can occur in association with oil and gas exploration, development, and production are the release of hydrogen sulfide gas, blowouts, and oil spills. However, existing safeguards and procedures would greatly reduce the possibility of accidents and the significance of their impacts. For example, no uncontrolled blowouts have been reported in the Bighorn Basin during the drilling of 1,800 wells, and in the past five years no pit failures have occurred in the planning area.

Between January 1, 1984, and December 1, 1986, 62 oil and/or water spills were reported in the planning area. On 26 of those, 90% or more of the fluid was recovered, and 30 of the spills involved less than ten barrels of fluid. It is anticipated that spills would occur in the future in approximately the same quantities.

Land use restrictions in Alternative A could preclude oil and gas exploration and development in some areas. In certain instances, restricting or prohibiting oil and gas development could limit production from a reservoir, causing a loss of royalties.

Land use restrictions based on standard mitigation guidelines for surface-disturbing activities (described in appendix B) affect the time, method, location, and amount of oil and gas exploration. These stipulations could directly prevent some areas from being explored or could make exploration, development, and production more expensive, which could indirectly reduce the oil and gas activity in those areas. The duration of seasonal restrictions and the percentage of federal lands affected by seasonal and fulltime restrictions on oil and gas development are summarized in table 3 (chapter 2).

Because of overlapping restrictions, drilling would be allowed for only two months on 2,500 acres each year in peregrine falcon recovery habitat. Most of those areas have high hydrocarbon potential. The restrictions could cause drilling to be spread over many years. This would increase exploration costs and could indirectly affect the amount of exploration that would be done.

No significant impact would occur from restrictions prohibiting surface-disturbing activities on about 2,480 acres of public land within 2.5 miles of one active bald eagle nest. Most of the public land tracts included in the 2,480 acres are small and could be explored by directional drilling.

No impact would occur from the restriction on surface-disturbing activities on about 7,500 acres within 0.25 mile of sage grouse and sharp-tailed grouse leks.

Approximately 18% of the planning area is covered by a seasonal restriction protecting grouse habitat areas from surface disturbances for six months each year. Since most of the wells in the Bighorn Basin are drilled within six months, this would not be expected to cause a substantial impact.

Seasonal restrictions would be applied to about 325,000 acres of big game crucial winter range. The effects generally would not be significant because the seasonal restrictions would not preclude drilling.

A seasonal restriction would be applied to approximately 40,260 acres within 0.75 mile of raptor nests. Since the affected areas are small and the restriction would not preclude drilling, it is unlikely that there would be any significant effect on oil and gas development.

Directional drilling might be required because of restrictions on surface-disturbing activities on approximately 1,300 acres in the black-footed ferret essential habitat area. This could increase the cost of exploration or development in the area. The ferret habitat is in an area of high potential for hydrocarbons.

Outside the essential habitat area, surface-disturbing activities would be prohibited on approximately 11,000 acres in black-footed ferret recovery habitat areas until ferret searches could be conducted. This could cause minor delays and increased costs in exploration and development.

A "no surface occupancy" restriction would be applied above cave passages on about 690 acres. These caves are in areas with low potential for hydrocarbon occurrence. No effects on oil and gas exploration and development would be expected.

A minor economic effect on oil and gas exploration or development could occur from restrictions prohibiting surface occupancy on fishing and hunting access areas, Five Springs Falls campgrounds, and R&PP lease areas. All of these public land tracts are small and could be explored and developed by directional drilling.

Surface-disturbing activities would not be allowed on about 7,000 acres in the Carter Mountain proposed ACEC because of slope restrictions to protect fragile soils. Effects on fragile soils generally could be mitigated sufficiently to allow exploration and development activity. However, the cost of exploration would increase in some areas because directional drilling would be necessary to reach potential reservoirs. Although no drilling has occurred in the proposed ACEC so far, interest in exploration in the Carter Mountain

area is extremely high. There would be no adverse effects on oil and gas exploration and development under Alternative A from management actions in the Chapman Bench and Little Mountain proposed ACECs or in the Five Springs Falls and Sheep Mountain Anticline areas.

There would be no adverse effects on locatable mineral exploration and development under Alternative A from management actions in the proposed ACECs. Portions of the Chapman Bench proposed ACEC and the Five Springs Falls area would remain closed to mineral entry under this alternative. Although there are a few existing mining claims in the Chapman Bench proposed ACEC and there have been claims in the Five Springs Falls area, both areas are considered to have low potential for occurrence of locatable minerals.

Livestock Grazing

Livestock forage would be removed by surface-disturbing activities such as oil and gas development, road and power line construction, ORV use, and implementation of range projects. This effect would remain until reclamation could restore vegetative productivity. After reclamation, livestock forage production would increase.

The construction of range projects and the use of intensive grazing management would lead to improved or static range condition on allotments with AMPs. Structural projects would involve the construction of 5.5 miles of fence and 3.5 miles of pipeline to improve livestock distribution. Vegetation manipulation would be used to restore productivity. Prescribed burning would be carried out on 770 acres, ripping and seeding on approximately 1,990 acres, and construction of contour furrows on 540 acres. These practices would result in long-term forage increases of about 430 AUMs.

Forage productivity would decline or remain static on allotments not covered by AMPs where overall range condition now is unsatisfactory. This would cause a long-term decrease of 1,029 AUMs and could perpetuate conflicts between livestock grazing and other resource uses and values. On some "I" category allotments, poor distribution of livestock would continue to cause improper forage utilization (see appendix G).

The cost of livestock production could increase because of the need to fence livestock out of riparian areas, to develop off-site water sources, or to herd livestock. The changes in production costs would vary among operators.

Livestock trailing would continue outside designated stock driveways. This would affect 17 allotments throughout the planning area. The allowable grazing use in allotments located along the trailing routes have not been properly adjusted to reflect the additional grazing associated with livestock trailing. The total number of AUMs used annually for trailing is about 370.

Other land uses such as mineral exploration and development affect available livestock forage by reducing vegetation.

There would be no effects on livestock grazing management from actions in any of the proposed ACECs under Alternative A.

Recreation

The estimated annual recreation use that would occur on public land under Alternative A is shown in table 24. Recreation opportunities are shown in table 25.

Access restrictions, surface disturbances, noise, odors, noxious fumes, and hazardous chemicals all would affect recreation activities because the opportunities for certain types of recreation would be lost or the quality of the recreation experience would be lowered.

Road construction for mineral development, timber harvest, or range improvements would open some previously inaccessible areas for motorized recreation. Increased traffic could lower the quality of the recreational experience of those who enjoy solitude. Access to remote areas would increase ORV activity and cause additional surface disturbance.

The "open" ORV designation would increase surface disturbance near mountain slopes and communities and cause conflicts with other recreation opportunities such as hiking, horseback riding, or mountain bike riding. Most of the recreational vehicle use in more remote areas (80% to 90%) would continue to occur on existing roads and trails.

Should access to public lands across private inholdings be closed, 25% of the opportunities for recreation would be lost. This would affect hunting, fishing, caving, and ORV use.

Rock climbing, casual shooting, white-water rafting, or commercial activities conducted by outfitters and guides could be restricted in some areas established for peregrine falcon recovery.

Conflicts could occur between rafters and hunters or between ORV users and horseback riders.

TABLE 24

ANNUAL RECREATION USE UNDER ALTERNATIVE A
(in recreation visitor days)

Type of Activity	West Slope Special Recreation Management Area	Bighorn River Special Recreation Management Area	Cave Special Recreation Management Area[1]	Historic Trails Special Recreation Management Area	Cody Extensive Recreation Management Area[2]	Total
Water-based use	0	800	0	0	800	1,600
Fishing, hunting & trapping	42,500	24,300	0	0	14,200	81,000
Off-road vehicle use	1,900	600	0	0	2,000	4,500
Cave use	25	30	900	0	95	1,050
Sightseeing and other recreation use	45,600	25,000	0	1,000	56,900	128,500
Total	**90,025**	**50,730**	**900**	**1,000**	**73,995**	**216,650**

[1] Includes only underground cave use; other recreation use taking place on the surface is included in West Slope Special Recreation Management Area or Cody Extensive Recreation Management Area.

[2] Includes some BOR withdrawn lands.

TABLE 25

RECREATION OPPORTUNITIES UNDER ALTERNATIVE A
(acreage)

Type of Recreation	West Slope Special Recreation Management Area	Bighorn River Special Recreation Management Area	Cave Special Recreation Management Area	Cody Extensive Recreation Management Area	Totals
Semiprimitive nonmotorized	1,220	0	0	49,980	51,200
Semiprimitive motorized	145,000	18,500	1,200	1,199,900	1,364,600
Roaded natural	7,000	23,000	0	430,800	460,800
Rural	12,080	500	0	393,820	406,400
Total	**165,300**	**42,000**	**1,200**	**2,074,500**	**2,283,000**

Note: Map 42 shows the areas suitable for each type of recreation.

Because recreational facilities would not be constructed at recreation sites under this alternative, the sites could be abused to a point where they would be used infrequently.

The percolation of water into caves or the quality of surface waters that flow directly into caves could be affected by surface disturbance caused by geophysical exploration, mining, timber harvest, drilling, or construction of drill pads, roads, and reservoirs near caves. The quality of the recreational and educational experience available at caves could be lowered by vandalism or by long-term use of fragile cave resources brought about by improved access or public knowledge of cave locations.

Current restrictions on surface-disturbing activities would not protect 17 known caves from impacts caused by oil and gas activity or mineral exploration. For example, caverns and passages could be filled with silt, mined for uranium or gypsum, or opened to the surface.

Increased human activity and noise would affect opportunities for users to enjoy semiprimitive nonmotorized and semiprimitive motorized recreation experiences. In addition, geophysical exploration during hunting seasons could alter hunting experience and success within a few miles of the exploration activity.

Construction of reservoirs might affect opportunities for semiprimitive nonmotorized recreation, depending on locations proposed for reservoirs. Increases in reservoirs and in access would increase opportunities for fishing and hunting.

Estimated recreation use under this alternative would be less than 50 RVDs per year in the Chapman Bench proposed ACEC, about 800 RVDs per year in the Five Springs Falls area, and about 1,770 RVDs per year in the Sheep Mountain Anticline area.

Recreation use in the Carter Mountain proposed ACEC under Alternative A would be about 1,500 RVDs per year, with a possible increase of 1% or 2% after designation of the ACEC. Fall hunting would account for 60% of this use, winter activities would represent 15%, and summer use would account for the remaining 25%.

In the Little Mountain proposed ACEC, recreation use would be about 1,200 RVDs per year until after designation of the ACEC, when there would be a small increase (not more than 5%). Cave-oriented recreation would account for 60% of the use, hunting and fishing, 28%, and sightseeing, picnicking, and camping, the remaining 12%. Unrestricted ORV use in the Little Mountain proposed ACEC could disrupt percolation of water into caves. This could reduce development of cave features and weaken existing features in a relatively short time period and result in lowering the quality of caving experiences.

Soils

Most surface-disturbing activities affect soils, causing on-site soil loss from wind and water erosion and compaction and often generating off-site sediment contamination in streams and downslope soils.

Soil loss can be caused by raindrop splash, by sheet, rill, and gully erosion, by wind erosion, and by mass wasting. Raindrops loosen and dislodge soil particles as they strike the soil surface. Sheet erosion is the washing of large areas with sheet-like, unconcentrated water flows. This is the initial phase in the downslope movement of soil particles dislodged by raindrops. Concentration of these flows forms small, shallow channels called rills that have widths and depths of a few inches. Sloping surfaces or large flow volumes cause this concentration process. The presence of rill erosion features indicates watershed deterioration.

The convergence of rills with increased flow volumes forms gullies that have widths and depths measured in feet. Gullies can be conduits for huge volumes of water and soil materials moving downslope to streams. Mass wasting is the loss of large soil volumes such as those caused by the collapsing or headcutting of gully walls, gully bottoms, and stream banks. It usually is measured in cubic yards (one cubic yard equals approximately one-half to three-fourths of a ton). The extent to which this progression of erosional features (sheetwash, rills, and gullies) is present on a landscape indicates the severity of the erosion problem.

On-site impacts usually involve removal of the vegetation. Since vegetation protects the soil from raindrop impacts, anchors the soil profile, and obstructs wind and overland water flow, any activities that remove this protective cover increase soil exposure to erosion. In addition, plant roots increase soil organic matter, the aggregation of soil particles, and soil porosity, all of which increase the soil's resistance to erosion. Drastic vegetation removal can lead to stages of localized desertification, in which the barren soil surface becomes so heated, dried, and crusted that the microclimate is too severe for plant germination or growth. Both wind and water erosion would intensify in such areas, possibly causing them to enlarge.

Erosion reduces soil productivity by reducing the volume of the root zone that holds water and nutrients for plants; both soil materials and plant nutrients are lost. Erosion promotes surface crusting and sealing, which in turn prevents moisture infiltration and seed germination and usually compounds the soil's susceptibility to further erosion (Nat. Soil Erosion-Soil Prod. Rsch. Plan. Com. 1981). Surface erosion on uplands gradually moves the uppermost fertile inches of the plants' growth medium to the valleys, where the addition of soil materials contributes little to soil productivity. Prolonged erosion on upland sites can transform vigorous grass communities with relatively deep soils into shallow-soiled scrublands or rock outcrops, and fertile riparian areas can become barren gullies.

Research by Langbein and Schumm (1958) indicates that a 25% increase in soil erosion on a relatively uneroding landscape may reduce its vegetative production by as much as 50%. As the rate of erosion would increase, the rate of decline in production would also increase. Such reductions in soil productivity result in reductions in forage available to livestock and wildlife. Reduced vegetative production on uplands also results in soil being lost into streams and reservoirs, degrading water quality and reducing reservoir usefulness because storage volume is lost to sediment.

Compaction is an on-site impact that compresses the soil volume, causing the collapse of air spaces, an increase in bulk density, and a reduction in soil porosity to air and water. Compacted soils become less accommodating to plant roots. In extreme cases, compaction can extend to a depth of 2 feet (the majority of the rooting zone). This may be irreversible if the compacting happens when the profile is wet. Compaction also increases water runoff and promotes erosion.

Off-site impacts that can be caused by erosion are the lowering of water quality through the addition of sediments and salts to streams and reservoirs. For example, sheet or rill erosion of upland soils high in clay or salinity can contaminate downslope soils by increasing their contents of salts or clay to excessive levels. More catastrophic erosion such as gully headcutting or mass wasting can contribute large volumes of foreign soil materials that cover existing vegetation and disrupt the established soil-plant ecosystem. Wind erosion also can cause the deposition of windblown soil materials on otherwise stable and desirable native plant communities. This can be an especially important impact when these downslope areas are intensively managed channel bottoms where forage production is highest, so that wildlife and livestock concentrate there.

The relationship of soil loss to soil development is the soil loss tolerance: the quantity of topsoil that a soil can afford to lose annually and replace by new topsoil development without declining in fertility and productivity. Most of the soils in the planning area have tolerances of less than 2 tons per acre per year. The tolerances of those that are very deep or highly fertile approach 3 tons. Two tons per acre equals a depth of less than 0.02 inch. This much erosion is almost imperceptible without sophisticated measurements, but such loss year after year becomes easily detectable. As the soil gradually loses its developing topsoil, it ceases to maintain fertility, it supports less vegetation, and its tolerance to erosion declines. The more topsoil is lost each year, the more susceptible to further erosion the soil becomes, so that the rate of soil loss increases.

Surface-disturbing activities would have direct and indirect impacts on soils. Impacts would be caused by such activities as geophysical exploration; construction of drill pads, roads, and other facilities for oil and gas operations; hazardous waste disposal and cleanup; produced water disposal; abandonment and reclamation of facilities; trenching and strip mining; landfill construction; farming; construction of power lines, pipelines, roads, and highways; timber harvesting activities such as skidding, mechanical slash piling, road building, and vegetation removal; fence construction; planting and seeding; grazing by livestock, wild horses, and wildlife; construction of water developments and reservoirs; spraying; prescribed burning; ORV use; recreation site construction; implementation and maintenance of watershed projects and contour furrows; and wildfire suppression.

Geophysical exploration would disturb up to 1 acre per mile of operation. Short-term damage or loss of vegetation, along with direct soil disturbance, could cause soil losses of about 5 tons per acre per year. Erosion would diminish within two to five years to predisturbance levels as vegetation is replaced. Geophysical exploration could involve the use of hazardous materials such as explosives or chemicals, which would damage vegetation, inhibit soil productivity, and cause possible health and safety hazards.

Excavation for drill pads and other oil and gas facilities would directly disturb soils and could cause erosion increases of as much as 80 tons per acre per year for each acre of construction. Complete reclamation, including the reestablishment of predisturbance vegetation and watershed stability, would take from five to ten years. Reclamation would not be expected to keep pace with the rate of new disturbances, so there would be a net long-term loss of soil.

Soil contamination from drilling fluids and associated chemicals for production drilling could affect up to an acre per drill site. Exploratory drilling would contaminate about 0.5 acre per drill site. The degree of impact would depend on the constituents of the drilling mud and the method of disposal. Burying drilling muds in reserve pits could limit soil development and fertility, and this could affect vegetation with deep root systems. Similar impacts could result from spilled chemicals, solvents, and fuels.

Spills or pit failures would have the potential to cause soil contamination and loss of fertility around drill sites. Vegetation productivity could be temporarily or permanently lost, depending on the nature of the liquids spilled.

Disposals of hazardous waste would contaminate and could permanently destroy soils and vegetation. Usually the entire contaminated soil volume would require removal. Vegetation loss and the exposure of soils to compaction and erosion would increase soil loss by 3 to 15 tons per acre per year.

Surface discharges of produced water could cause massive soil erosion around discharge facilities, possibly as much as 150 tons per acre per year of erosion into receiving drainages. Long-term rates could be as much as 20 tons per acre per year downstream from discharge points. On the other hand, discharge facilities could enhance vegetation and increase soil productivity.

Reclamation of drill pads, roads, and other disturbed areas could reduce erosion rates from initial disturbance levels to predisturbance levels within two to five years under most conditions. These practices could eliminate the impacts of the disturbances if topsoil layers were saved and replaced, proper seed mixtures and techniques were used, and sites were properly prepared, by ripping of compacted areas and recontouring of landscapes to match original contours.

Surface mining and trenching would cause soil erosion rates of up to 100 tons per acre disturbed per year during excavation. Depending on local conditions, this rate could decline to near predisturbance levels in 5 to 20 years with rehabilitation. For abandoned and unrehabilitated mines, rates would persist at about 15 tons per acre per year. Soil contamination could result from placement or leaching of spoil piles, the use of toxic chemicals, the methods of equipment operation, and erosion of soil from the site. Depending on the nature of the operation, these impacts could involve as much as 10 acres per mine and could lead to declines in vegetative growth and soil protection.

Farming activities on desert land entries would increase erosion by up to 75 tons per acre per year. This could further cause sedimentation and erosion on adjacent wetlands. Construction of access roads would cause soil losses comparable to those caused by other excavation activities—loss could be up to 80 tons per acre of road.

Reservoir construction would cause up to 70 acres of soil loss per site during construction. Grazing concentrated around the water source could cause long-term, localized acceleration of erosion: loss could amount to as much as 5 tons per acre per year on up to 10 acres. Soil vegetative production would be lost during construction but would return to normal or increase over the long term with proper site rehabilitation. In addition, reservoir placement could improve watershed stability in the drainage, reducing erosion in the local drainage segment by 5 to 7 tons per year.

In the first two years after harvest, clearcut timber harvesting would increase erosion rates by as much as 5 tons per acre logged. Commercial firewood harvesting would cause soil losses of 0.5 to 2 tons per acre. Construction of logging roads and skid trails would cause as much as 45 tons of soil erosion per acre of trail per year until rehabilitation could be completed. Recontouring and revegetating roads, trails, and severely cut areas immediately after harvest could reduce soil loss to precut levels within two to five years, allowing soil stability and productivity to regenerate.

Fire suppression would cause soil erosion in burned areas at rates that would depend on the intensity of the suppression effort. Full suppression could lead to losses of up to 15 tons per acre on fire lines and in areas where heavy equipment was used.

Prescribed burning for range or watershed stabilization projects would cause about 0.5 tons of soil loss per acre. Immediately after burning, soil loss could increase by a rate of 2 or 3 tons per acre per year from the temporary lack of vegetative cover. However, within two years soil erosion could be reduced by 3 to 5 tons per acre per year through improved vegetation. Erosion levels could be lower than preburn levels, depending on the composition of the reestablished vegetation.

The maintenance of public roads would cause about 20 tons of soil loss per acre of road maintained per year, while the loss of soil materials from exposure to wind and water erosion on existing roads would be about 5 tons per acre.

Recreational use of established trails and roads would cause about 1 ton of soil loss per acre of trail or road per year. Erosion on off-trail areas

would average at least 2.5 tons per acre disturbed per year because much of this use would take place during periods of high soil vulnerability to disturbance. This impact would intensify in some areas with time as fragile soils became newly exposed to erosional forces. Soil compaction would increase with ORV use by approximately 2 acres per mile of trail. This compaction would reduce soil productivity and increase runoff loss and sedimentation.

Soil disturbance caused during seedbed preparation for surface rehabilitation would produce a short-term soil erosion loss of 1 to 2 tons per acre per year (for about two years), depending on the site. However, the increase in cover after the establishment of vegetation would result in a long-term reduction in soil erosion of as much as 5 tons per acre per year, depending on the site and the condition of the ground cover. Seeding or planting projects could reduce runoff by as much as 90%, which in turn would reduce erosion, sedimentation and peak flows. This would lead to improved water quality, reduced channel filling, and a reduced physical damage to wetlands. Depending on initial conditions, soil productivity could increase by 100% as a result of planting and seeding.

Maintenance of existing watershed projects would cause some adverse short-term impacts that would be mitigated and reversed in the long term. Short-term impacts would be reduced soil productivity, accelerated erosion, and lowered water quality. These impacts would be reduced or eliminated in the long term through reclamation practices and natural vegetative recovery. Construction activities would temporarily reduce soil productivity and accelerate soil erosion by 2 to 5 tons per acre per year on disturbed sites. In the long term, the soil disturbance and loss would be decreased by 5 to 10 tons per acre per year as vegetation was reestablished and channel erosion below the maintained sites was reduced.

During the initial two years of contour furrowing projects, soil erosion would increase by 5 to 10 tons per acre per year because of construction activity. Within two to five years, water infiltration would increase, and runoff, erosion, and sedimentation would decrease. Soil productivity could improve as much as 100% on treated areas.

Table 26 shows the types of activities that commonly affect public lands, the areas each one normally disturbs, and the estimated maximum soil losses that could be expected. The rate of disturbance per unit and loss per acre per year are reasonable figures based on field observations, literature, and consultation. They provide a sense of scale and a basis for comparison of the impacts from the various activities.

Table 27 lists the estimated soil loss by resource management activity and indicates which soil units would be most affected by the activities. The soil loss figures represent losses only for the year in which the disturbances take place. Cumulative year-to-year soil losses have not been measured; in most cases these losses decline during the following two to five years and approach predisturbance levels, depending on the local conditions and the success of rehabilitation. These figures represent both water and wind erosion; the majority is the result of water erosion, but figures on the proportions are unavailable.

Under Alternative A there would be approximately 2.6 million tons of accelerated soil loss per year. This is an annual rate of 2.45 tons per acre. The amount of soil loss attributed to the particular activities shown on Table 27 are proportional to the total area affected by these activities. The greater the area affected by the various activities, the more the activity will contribute to the overall impact.

Grazing, for example, is a use of the public lands that is wide-spread and influences much of the planning area and therefore is shown to contribute nearly 73% or 1.9 million tons of the total accelerated soil loss per year. The other activities influence less area or are more site specific in their effect and therefore contribute less to the total accelerated soil loss per year. Recreation activities, primarily ORV use, would contribute about 17.5% of the annual total. About 8.5% of the soil impacts would be caused by minerals activities, primarily surface mining operations concentrated in the B6 general soil unit (see map 43). The remaining 1% of annual soil impacts would be caused by all other activities. Combined with the estimated natural erosion rate of 1.3 tons per acre per year, the planning area would have a total erosion rate of about 3.75 tons per acre per year, or a total of nearly 4,067,800 tons per year.

Table 26 shows the amount of soil loss per acre caused by the various activities. These soil loss estimates are generally more relevant in terms of specific impacts by specific activities then what each activity contributes to the total accelerated soil loss. Activities resulting in soil losses of 70 to 80 tons per acre will merit greater attention with regard to developing mitigating measures then those activities causing losses of 1 to 4 tons per acre, which is an imperceptible loss.

Under Alternative A, soil losses on about 250 acres in the Carter Mountain proposed ACEC would be caused by surface-disturbing activities, primarily those related to oil and gas exploration and development and ORV use. Soil impacts would be reduced in the Chapman Bench proposed ACEC because actions contained in one

TABLE 26

ACTIVITIES AFFECTING SOILS, ESTIMATED AREAS OF DISTURBANCE, AND MAXIMUM ANNUAL SOIL LOSSES

Activity	Acreage of Disturbance/Unit	Maximum Soil Loss (tons per acre per year)
Cultural Resources		
Paleontological investigations		50.0
Fire and Access Management		
Full suppression (fire lines)		15.0
Prescribed burning		0.5
Existing roads	3.0/mile	5.0
Road maintenance	3.0/mile	20.0
Forestry		
Clearcut logging (vegetation removal)		5.0
Skid trails	3.0/mile	40.0
Access roads	3.0/mile	45.0
Landings	0.5/site	40.0
Lands and Realty		
Distribution power line (pole)	1.0/mile	1.5
Telephone line (buried)	0.5/mile	30.0
New access road	4.0/mile	80.0
Existing sanitary landfill		30.0
Minerals		
Seismic activity	1.0/mile	5.0
Wildcat well (including road)	4.0/well	80.0
New production well	3.0/well	70.0
Existing production well	1.0/well	5.0
New tank, treater facility	2.0/unit	75.0
Existing tank, treater facility	2.0/unit	5.0
Pipeline, flowline	2.0/mile	30.0
Sand and gravel mining	5.0/ pit	60.0
New surface mine (bentonite, gypsum)		100.0
Operating surface mine		40.0
Abandoned surface mine		15.0
Range and Wildlife		
Livestock grazing		1 to 4.0
Reservoir construction	2.0/unit	75.0
Pipeline construction	1.0/mile	20.0
Fence construction	0.5/mile	1.0
Contour furrowing, ripping		1.0
Recreation		
Two-track trail use (vehicles)	1.5/mile	1.0
Off-road vehicle use	2.0/mile	2.5
Hiking trail use	0.2/mile	0.1
Cave hiking	0.1/mile	1.0

AMP would be implemented to improve range condition. In the Little Mountain proposed ACEC and in the Five Springs Falls and Sheep Mountain Anticline areas, soil impacts would result from exploration and development of leasable and locatable minerals, livestock grazing, right-of-way construction, and ORV use.

Vegetation

Vegetation would be affected by surface-disturbing activities such as those listed under "Soils." The impacts would result from partial or total removal of vegetation. While some impacts from surface-disturbing activities are short term,

TABLE 27
ESTIMATED SOIL LOSS UNDER ALTERNATIVE A

Activity	Soil Loss (tons per year)	Soil Units with the Greatest Soil Loss
Cultural resources management	2,500	B3, B2
Fire management	800	B6
Forest management	700	M1
Lands and realty management		
Access management	7,200	B2, B3, M1
Other	24,600	B6, B3, B7
Range Projects	1,600	B2, B3
Grazing (short-term and long-term)	1,925,000	B2, B3, B6
Minerals activities	224,700	B2, B6
Recreation	460,700	M1, B1, B6
Total accelerated erosion	2,647,800	B2, B3, B6, M1
Estimated natural erosion	1,420,000	B2, B3, B6
Total erosion	**4,067,800**	**B2, B3, B6, M1**

others may last more than 20 years. For example, revegetation of bentonite mines in the eastern portion of the planning area is not very successful because the soils are poor and the area has low precipitation. Other long-term impacts would be caused by construction of permanent roads, structures, and other facilities.

Construction of drill pads, roads, pipelines, power lines and other facilities for oil and gas operations would result in the net loss of vegetation from almost 200 acres per year. It is estimated that 80% of the area disturbed by oil and gas related activities would be reclaimed and revegetated within three years. Reestablishment of vegetation on sites that have been disturbed for long periods would be difficult if topsoil became sterile or eroded away. Geophysical exploration usually would disturb vegetation on less than 1 acre per mile of operation.

The discharge of good quality produced water into streams would increase the amount of wetlands; however, wetland values could be affected by the release of poor quality water containing high concentrations of salts, oil, grease, and other pollutants.

The localized overuse of forage by domestic livestock, wild horses, and wildlife would affect riparian and wetland values by causing increased soil erosion, compaction, and invasion of less desirable plant species. The most common example of this invasion is the replacement of the riparian vegetation type with the greasewood type.

Vegetation would be disturbed by activities associated with trenching and strip mining for locatable and salable minerals, especially bentonite. For example, vegetative cover is removed or destroyed from areas that are used for trenching, mining, haul roads, and storing overburden and topsoil. In most cases, the poor growth mediums of the soil types and the low precipitation in areas where bentonite is found have made it difficult to replace the original vegetative community through reclamation. Most of the impacts on vegetation from bentonite mining would be expected to occur in the salt shrub vegetation type.

Since a site may be mined for more than ten years, complete revegetation of sites becomes even more difficult. By the time reclamation begins, topsoil may be sterile or eroded. Even intensive reclamation efforts may not reestablish vegetation within five to ten years. Typically, net vegetative productivity is reduced on 400 acres per year by bentonite mining and on fewer than 20 acres per year by sand and gravel mining.

The area needed for sanitary landfills usually is about 3 acres per 10,000 people per year. Vegetation on less than 10 acres per year would be disturbed for landfills in the planning area; approximately one AUM of forage would be lost.

Farming on desert land entries would cause existing vegetation to be replaced by such irrigated crops as alfalfa, barley, corn, sugar beets, or dry beans. The value of production depends on crop yield and price. Crop production would

change the vegetative composition and would involve such activities as tilling the soil; seeding crops; irrigating; applying fertilizers, herbicides, and insecticides; and harvesting. Farming on desert land entries probably would occur on salt shrub, sagebrush, and sagebrush/grass vegetation types.

Proposed wild horse numbers would be at a level that would stabilize current range conditions in most of the herd area. No improvement in condition would be expected on 62,000 acres in the herd area, but vegetation on 7,660 acres would be improved by at least one condition class, primarily through reductions in livestock numbers and natural regeneration.

Range condition would decline or remain in unsatisfactory condition in some "I" category allotments. Upland basal vegetative cover would remain essentially unchanged. Compaction, soil loss, and the decline in vegetative productivity would depend on the amount of grazing. Forage utilization by livestock in wetlands would be about 70% to 80% of existing forage levels.

Localized overuse of forage can result when too many animals graze in an area for too long a time. When forage is overused, plants cannot provide for their own growth, maintenance, and reproduction, so they eventually are replaced by less desirable species, many of which produce little or no forage. This can lead to a downward trend in range condition. Such a situation can encourage accelerated soil erosion and further site deterioration.

On the basis on the inventory that was done for ecological condition class it is estimated that about 46% of the acreage inventoried would remain in poor condition, 23% would remain in fair condition, 11% would remain in good condition, and 3% would remain in excellent condition. In 17% of the acreage inventoried, the condition class is undetermined (i.e. includes woodlands, mined lands, rock outcrops). About 75% of the planning area was included in the ecological condition class inventory. Because the inventory focused on "I" category allotments and areas of perceived vegetation conflicts, ecological condition for the planning area as a whole may be somewhat better than conditions shown by the inventory. Ecological condition could also be subject to modification based on further analysis of SCS range guidelines in the Bighorn Basin. (See section on vegetation inventory methods and history in the planning area, appendix G.)

Although all 12 vegetation types would be affected by livestock grazing, most impacts would occur on the salt shrub, sagebrush, sagebrush/grass, grassland, riparian, and juniper vegetation types. Range project implementation would remove vegetation on 3,300 acres which would rehabilitate to at least a good range condition after 20 years. This would be most prevalent in the sagebrush, sagebrush/grass, salt shrub, riparian, greasewood, and grassland vegetative types.

Fencing would be used to improve forage and habitat condition on upland and wetland sites. Range condition should improve when fences are used to implement AMPs. In wetlands, fencing would control livestock use and improve habitat and watershed condition. More varied vegetation would be produced, and soil erosion would be reduced.

Water developments would improve livestock and wildlife distribution and encourage more even utilization of forage and less damage to vegetative types. This reduced grazing pressure would reduce vegetation damage, compaction, erosion, and sedimentation in wetlands. Channel stability and general watershed condition would improve. Fenced water developments would create new wetlands.

Construction of reservoirs and fencing of each new reservoir would remove vegetation from about 10 acres per reservoir. However, each new reservoir also would create 2 to 3 acres of wetland habitat and store as much as 20 acre-feet of water. Reservoir construction would improve livestock and wildlife distribution and provide more even forage utilization in areas that are now without water.

Prescribed burning would cause a long-term decrease in shrub species (as much as 95% of acreage burned) a short-term increase in annual weeds, and a long-term increase in grass species (up to 50% of acreage burned). Total forage production would decline for about the first two growing seasons after burning. After the second year, livestock forage would increase, and range condition and forage production would improve in the third year after burning.

Wildfires cause a short-term loss of vegetation and livestock forage on rangelands. Within three years, livestock forage generally would exceed original levels as grasses replaced shrubs. The surface disturbance associated with fire line construction, the use of heavy equipment, and other fire suppression activities often damages or destroys vegetation and accelerates the annual natural soil erosion. In forested areas, wildfire changes the vegetative composition from forest to the open grass/shrub type. Wildfire usually would occur on sagebrush, sagebrush/grass, mountain shrub, juniper, and conifer vegetation types.

Repeated ORV use would damage vegetation because vehicle tires crush and tear plant tissues,

eventually destroying the plant cover. These activities often occur in areas that are too steep or erosive for road construction. This combination of vegetation loss and activity on steep erosive soils produces excessive soil erosion and causes further impacts associated with sedimentation on adjacent areas. Vegetation would be damaged or destroyed on approximately 2 acres per mile of ORV use. All vegetation types would be damaged by ORV use, but such damage would be most common on badlands, sagebrush, and salt shrub vegetation on steep slopes.

The condition of vegetation on about 2,700 acres of prairie dog towns would remain static or continue to decline. Prairie dog control on about 225 acres would improve range condition. Prairie dog towns are found in salt shrub, grassland, sagebrush, and sagebrush/grass vegetation types.

Forest management activities would reduce age class and plant species diversity on 500 acres after 20 years. Vegetative improvement (thinning) would occur on 970 acres after 10 years. Impacts from forest management would be confined to the conifer vegetation type.

No effects on vegetation would be expected under Alternative A from actions in any of the proposed ACECs.

Visual Resources

The area's scenic quality would be affected by construction, mining, timber harvesting, livestock grazing, ORV use, and recreation activities.

Surface alterations such as seismograph trails, drill pads, roads, and pipelines generally are less visible than structural facilities, and areas affected by such activities can often be restored to their former condition. However, if revegetation should be unsuccessful, the ground would remain barren or become infested with weedy species. This could cause long-term visual contrasts with the surrounding landscape.

Drill pads and roads that are placed on drainages or in broken country are difficult to reclaim; thus, visual impacts in these areas often are long-standing. The significance of the impact would depend on the scenic quality and the visual management class of the area.

Mining and oil and gas exploration and development would affect the line, form, color, and texture of the natural landscape. Approximately half of the disturbances related to those activities would cause long-term or permanent changes in the existing natural landscape.

Desert land entries and R&PP patents would cause changes in landforms or in the amounts and types of vegetation in limited locations or viewsheds. Power lines or pipelines would affect the line, form, color, and texture of natural landscapes for miles. There would be long-term or permanent visual impacts on about 20% of the area disturbed for such facilities.

Visual quality would be affected by timber harvest on a much greater area than is actually harvested because of the very apparent contrast in line, form, texture, and color. These impacts usually would last less than 50 years, or until the timber stands were reestablished and approached commercial height.

Visual quality generally either would not be affected by livestock grazing on "M" category allotments or would improve slightly as range conditions improved. To a large degree, visual quality is related to vegetative composition and range condition. As the vegetative composition changes, so does the visual variety and the form, line, color, and texture elements of the landscape. Visual impacts would be most severe in areas where livestock would concentrate. In such areas, there would be a visual contrast between heavily grazed areas and other areas.

ORV use would also lower the visual quality of the natural landscape. The greatest impact would be apparent near populated areas and roads because of the intensive use of those areas.

No effects would be anticipated from maintaining the existing VRM objectives in the Carter Mountain and Chapman Bench proposed ACECs and in the Five Springs Falls area. Visual quality would be improved in the Little Mountain proposed ACEC through cleanup of some of the area's uranium mining and exploration diggings under the state of Wyoming's abandoned mined land reclamation program. Visual quality would decline in the Sheep Mountain Anticline area because of continued locatable minerals mining and exploration activity and because of unrestricted ORV use.

Water Resources

The activities that affect soils and vegetation also would affect surface water. Surface-disturbing activities and vegetative manipulations would change the quantity and quality of water, and timing of water flow, generated from the areas where those activities occurred. Whenever vegetative cover decreases or is removed, surface runoff increases, peak flows increase, and water quality deteriorates because of increased sedimentation. If vegetative changes are widespread, seasonal fluctuations in water discharge also may occur; for example, the removal of vegetation

increases streamflows during storm events and reduces streamflows during dry periods.

The most apparent effect on water resources from surface-disturbing activities and vegetative removal is the deterioration in water quality from increased sedimentation attributable to the erosion that occurs within a drainage basin. The percentage of eroded soil in a watershed that reaches its stream channel is termed the sediment-delivery ratio (SDR). SDRs are highly variable and are influenced by the physical features (drainage area, slope, channel density) and hydrologic characteristics (precipitation amount, intensity, and seasonal distribution) of the drainage basin. The SDR for the major tributary streams in the planning unit averages 10%.

The disposal of produced water from oil and gas operations is regulated by the notice to lessee. Most produced water is disposed of by discharging to a surface drainage. Other disposal methods are injection into a subsurface reservoir and the use of lined or unlined pits. Reinjection of produced water generally is limited to formations in which the quality of water is similar to or poorer than that of the injected water.

Produced water discharged to a surface drainage must meet the water quality standards of the National Pollution Discharge Elimination System (NPDES), which in Wyoming is administered by the DEQ. Produced water may lower the quality of the receiving surface water enough to preclude its use for municipal drinking water, wildlife, recreation, or irrigation purposes. When produced water is discharged to ephemeral channels, it can create additional aquatic habitat. The accumulation in stream channels of settleable solids like iron sulfate and oil-coated sediments also accompanies produced water discharges. Over the long term, this accumulation may render a stream incapable of supporting fish and affect channel characteristics long after produced water discharges cease.

Under Alternative A, the amount of sediment delivered to streams would change very little from the current level of 410,900 tons per year. Continued implementation of soil conservation projects related to the Bighorn River and West Slope HMPs would reduce sediment delivery to the Bighorn River by about 4,000 tons per year. Reforestation on Rattlesnake Mountain would reduce sedimentation through Trail Creek to the Shoshone River. Continued implementation of projects called for in AMPs would reduce sediment loadings in some drainages. Some AMPs call for construction of reservoirs in Pat O'Hara Creek and Big Sand Coulee (Clarks Fork drainage) and in the Trail Creek and Cottonwood Creek tributaries of the Shoshone River. Maintenance of water spreaders in Little Dry Creek drainage would prevent stored sediment from migrating out of the drainage. Suspended sediment loadings by drainage are presented in table 17 in chapter 3.

Additional reductions in sediment loads in the Shoshone River from Buffalo Bill Dam to the Bighorn River and in the Bighorn River from Greybull to the Bighorn Reservoir would be brought about through implementation of watershed activity plans for subbasins within these priority river segments (see map 17).

The increased use of water reinjection wells and water floods and the shutting in of stripper and marginally profitable wells eventually would cause a decline of about 10% in produced water discharge volume. This would result in the discharge of about 16,200 acre-feet of produced water per year from the planning area. Salt loading would decline to about 78,900 tons per year. The reduction of produced water discharge volume would reduce the amount of water flowing into Bighorn Lake from the Bighorn River by about 0.04%, while salt loads would decline by 0.27%. Similarly, the water yield of the Shoshone River to Bighorn Lake would decline by about 0.13%, and salt loading would decline by 0.67%.

Reductions in discharges of produced water would decrease salt concentrations and other pollutants such as oil and grease in receiving perennial streams. This would lead to slight improvement in water quality in the long term. However, over time wetland and riparian habitats and livestock and wildlife watering locations would receive less water. The loss of wetland habitat would be most noticeable where produced water makes up a high percentage of the annual water yield (see the section on wetlands). Table 18 in chapter 3 lists the amount of produced water that would be discharged into major drainages.

There would be no effects on water resources under Alternative A from actions in any of the proposed ACECs.

Wetlands

Under Alternative A, livestock grazing and surface-disturbing activities in wetland areas would destroy some emergent and riparian vegetation that furnishes food and cover for wildlife. Locally, such activities can prevent the regeneration of cottonwood and other woody plants, compact soil, increase surface salinity, hinder plant growth, lower water tables, and cause loss of riparian habitat.

Surface disturbances on uplands would affect wetland habitat by increasing peak flows. Increased peak flows can erode channel banks and

reservoir spillways, overload reservoirs with silt, and decrease late season flows in streams. Increases in the speed of runoff would mean that less favorable moisture conditions would be available for germination and growth of stream zone vegetation.

Surface disturbances in wetland zones would cause about 5% of the perennial stream riparian zones to drop into a lower value class and about 5% of riparian zones along intermittent/ephemeral streams to drop into the unsatisfactory condition class.

The amount and condition of wetland habitat associated with existing reservoirs are now stable, but the condition eventually would decline as reservoirs deteriorated with age and were not replaced. Wetland habitat associated with most springs and canals would remain stable. Wetland habitat would be reduced along Loch Katrine and streams that currently receive large volumes of water discharged as a product of oil and gas production if the amount of produced water should decline or if it was reinjected for secondary or tertiary recovery.

Wetland habitat associated with streams, reservoirs, and springs would steadily improve in the four allotments proposed for new grazing management. Habitat improvement projects would improve wetland habitat associated with about 60 reservoirs, 10 miles of streams, and five springs. Overall, the wetland habitat conditions within the planning area would be stabilized or slightly improved under this alternative.

There would be no effects on wetlands under Alternative A from actions in any of the proposed ACECs.

Wild Horses

At a population level of 100, a healthy breeding herd of wild horses would be maintained.

There would be no effects on wild horses under Alternative A from actions in any of the proposed ACECs.

Wildlife and Fish Habitat

Fisheries

Of the 149 miles of streams designated Class 1 through 4 (sport fisheries designation) by the WGFD, about 5 miles could enter the poor condition class within the next ten years under this alternative. However, perennial stream zone conditions would gradually improve in 4 grazing allotments. Combined with habitat improvement associated with development of wildlife projects, this could result in a net improvement in fish habitat throughout the planning area.

Reservoirs containing fish would slowly lose their support capability as depths were reduced from natural and human-caused siltation. Siltation would cause at least one reservoir to become unsuitable to support a fishery. Reservoir maintenance would reduce the rate of sedimentation in some reservoirs and bring about improvement of approximately 10 miles of stream habitat.

There would be no effects on fisheries under Alternative A from actions in any of the proposed ACECs.

Wildlife Habitat

Terrestrial Habitats and Animal Communities. Table 28 summarizes the effects on wildlife habitat that could be expected to occur under Alternative A.

Recreational activities in wetland habitats during breeding seasons would increase stress on breeding animals and would decrease wildlife production.

The application of chemicals to control noxious weeds and insects would cause declines in populations of songbirds and invertebrate prey animals. Use of chemicals would indirectly affect other wildlife populations, especially when these treatments occurred in river drainages, in upland riparian habitats, and around agricultural lands.

Prescribed fire would be used during the next ten years to reduce fuel loads beneath forest stands. This would reduce the potential for heat-intensive fire and loss of high-value forestlands on about 570 acres of public land.

Management actions such as plantings to improve vegetative species diversity, management of road and vehicle access, and timber harvesting to increase habitat edge effect, would improve animal species diversity and the quality and diversity of habitat in 5,900 acres (46%) of high-value forestlands. This would benefit approximately 160 wild animal species, including accipiters, cavity-nesting owls, moose, and elk.

Production and Recovery Habitat for Endangered Species. Approximately 60 acres of black-footed ferret recovery habitat would be eliminated in the next ten years by surface disturbance from oil and gas exploration, and about 30 acres would be eliminated by bentonite mining. This constitutes 1%

TABLE 28
EFFECTS ON WILDLIFE HABITAT UNDER ALTERNATIVE A

Type of High Value Habitat	Continued Decline in Both Short Term and Long Term (acreage)	Continued Decline in Short Term; Improvement in Long Term (acreage)	Improvement or No Change in Both Short Term and Long Term (acreage)
Forestlands		6,470	6,330
Endangered species production and recovery habitat			
Black-footed ferret	90		13,900
Bald eagle	170	30	660
American peregrine falcon			9,000
Candidate species production and recovery habitat			
Mountain plover	180	450	14,700
Long-billed curlew	180	450	14,700
Swainson's hawk	5,425	4,500	10,575
Swift fox		3,300	10,700
Waterfowl production habitat	5		
Sandhill crane staging habitat		900	
Raptor production habitat	920	21,000	143,000
Sage grouse production habitat	1,990	36,800	529,000
Big game ungulate support, winter, and parturition habitat			
Pronghorn	196,000	243,000	642,000
Elk	34,300	75,500	54,000
Mule deer	230,700	414,000	294,300
Moose	26,000		25,000
Bighorn sheep	26,800	22,300	42,000

Note: This table displays quantifiable impacts only. See the narrative for the complete impact analysis.

of the ferret recovery habitat. Effects on ferrets would be unlikely. Surface disturbances would not be permitted until after the completion of ferret surveys.

The habitat quality of 170 acres (1%) of bald eagle production habitat would be reduced by human intrusions and other activities associated with mining claim development. Bald eagles probably would not be affected during the next 10 years, but bald eagle production could be lowered by mining activity in 10 to 25 years. In addition, human intrusions and other disturbances from oil and gas activity would lower the quality of 30 acres (13%) of bald eagle recovery habitat on public land but probably would not eliminate habitat. These disturbances would probably displace wintering eagle populations and prevent nest establishment in recovery areas during exploration. The development of oil and gas fields within 0.75 mile of eagle recovery areas would probably displace wintering eagle populations and prevent nest establishment in the recovery areas for the life of the field.

Six nesting pairs of American peregrine falcons would be expected to occupy portions of the planning area in the next ten years. This would be made possible by restrictions on pesticide applications, restrictions on surface-disturbing activities in 9,000 acres of habitat with high potential for peregrine falcon recovery, and reintroduction of 30 to 60 peregrine falcons to the planning area.

Production and Recovery Habitat for Candidate Species. The quality of production habitat for long-billed curlews and mountain plovers would be reduced in the next ten years by human intrusions and other disturbances from oil and gas activity. This would occur on about 450 acres (2%) of such habitat both inside and outside the Chap-

man Bench proposed ACEC. Much of this disturbance would occur during periods of nest site selection and brood rearing; therefore, the effects on curlew and plover production would be greater than if it occurred at other times.

Approximately 20 acres of production habitat for long-billed curlews and mountain plovers on Chapman Bench would be eliminated by surface disturbances and other activities related to mining claim development. These activities also would lower the quality of 160 acres (1%) of such habitat and could prevent nesting by one pair of one of these species.

Any chemical treatment to control noxious weeds or insects on Chapman Bench or along Pat O'Hara Creek would reduce the invertebrate food base. Curlew and plover production in the proposed Chapman Bench ACEC would be proportionately reduced by such actions until the invertebrate populations could recover.

Breeding curlews and plovers would be subject to stress from the construction or improvement of roads and the use of ORVs during the period of nest site selection and brood rearing. Such human intrusions would adversely affect production of these species at undetermined levels. In addition, the construction of aboveground power lines on Chapman Bench would increase collision mortalities.

The ACEC proposal for Chapman Bench would include development and improvement of 6,000 acres of foraging and production habitat for curlews along Sand Coulee Draw. However, the adverse impacts described above would limit increases in curlew production to 30%.

Human intrusions into Swainson's hawk nesting areas and other disturbances from oil and gas field development during the next ten years would cause abandonment of one of the four active nests in the planning area. This impact would last for the life of the field and (because of the sensitivity of Swainson's hawks to human intrusions) could be permanent if a road visible from the nest was constructed within 0.75 mile of the nest. Surface disturbances and other activities from wildcat well development would reduce useable nesting habitat on public land by 300 acres (1%) and lower the quality of 4,500 acres (22%). One additional nest site might be affected by these disturbances.

New ferruginous hawk nest sites would be protected by existing protection measures under Alternative A. The potential for species recovery in the planning area during the next ten years would be lower under this alternative than under alternatives providing more protection.

Available swift fox recovery habitat would be reduced by about 30 acres during the next ten years by disturbances from oil and gas activities, which also would reduce the quality of 3,300 acres (24%) of such habitat. Implementation of the *Prairie Dog Ecosystem Habitat Management Plan* (USDI, BLM 1986c) would bring about increases in the populations of prey species on 2,500 acres (18%) of swift fox recovery habitat.

Production and Staging Habitat for Waterfowl and Water Birds. The quality of 900 acres (2%) of sandhill crane fall staging/roosting habitat would be reduced in the next ten years by human intrusion and other disturbances due to oil and gas activities. This would cause a 1% reduction in the crane population.

Waterfowl production habitat managed under the Bighorn River HMP/RAMP (USDI, BLM 1987a) would be reduced by about 5 acres by surface disturbances from mining claim development.

Construction of aboveground power lines along major river drainages would be expected to lead to increased collision mortalities of water birds if the power lines crossed wetland habitats, flight routes to feeding areas, or migration corridors.

Chemicals applied to control noxious weeds and insects would cause a localized reduction of the invertebrate prey base in the affected area. Because of this, the production of waterfowl, double-crested cormorants, and great blue herons would be reduced.

Raptor Production Habitat. Human intrusions and other disturbances from oil and gas development would reduce the raptor production habitat on public land by about 400 acres and lower the quality of 21,000 more acres (13%) during the next ten years. This would temporarily eliminate raptor production at 11 to 22 nest sites during the period of development and (because of the sensitivity of raptors to human intrusions) could permanently stop production at these sites if roads visible from the nests were constructed within 0.75 mile of the nests.

Available raptor production habitat would be reduced by about 520 acres and one nest probably would be abandoned because of human intrusions and other disturbances from mining claim development.

Construction of aboveground power lines along major river drainages would be expected to lead to increased collision mortalities of certain

raptor species if the power lines crossed wetland habitats, flight routes to feeding areas, or migration corridors.

Road maintenance would be carried out within 0.75 mile of nest sites during the nesting season, and roads would be constructed or improved in those areas at other times. The increase in human intrusion and disturbances in crucial raptor nesting habitat during the nesting period would cause the abandonment of five nest sites (3% of the nests on public land).

Grouse Production Habitat. Available sage grouse nesting habitat would be reduced by about 890 acres and the quality of 36,800 more acres (6%) of such habitat would be reduced by human intrusion and other activities related to oil and gas exploration. Six strutting grounds would be eliminated. An area of severe conflict between sage grouse and mineral development is shown on map 50. Grouse populations in this area would recover only through long-term recolonization of available habitat after the end of oil and gas field production.

The habitat quality of 1,100 acres of sage grouse production habitat would be reduced by human intrusions and other activities associated with bentonite mining. One strutting ground would be eliminated by this disturbance.

Sage grouse production habitat would not be protected from ORV traffic under this alternative, and localized human disturbances during the nesting season could have a significant localized effect on populations.

Invertebrate prey animals used by juvenile sage grouse and sharp-tailed grouse would be reduced by the use of chemicals applied to control insects and noxious weeds. This could affect production in localized grouse populations.

Habitat for Big Game Ungulates. Forage conflicts among livestock and big game ungulates are caused by competition for available food plants. Conflicts occur when grazing animals remove more forage from a preferred plant species or plant group (such as grasses, forbs or shrubs) than can be replaced by the plants under normal climatic conditions; or when more total forage is removed from all plant groups than can be replaced. The effects of these conflicts on forage include the gradual replacement of preferred grass and forb species by shrubs or by less preferrable grasses and forbs, the invasion of less desirable plants, and an overall decline in the total forage production of the range.

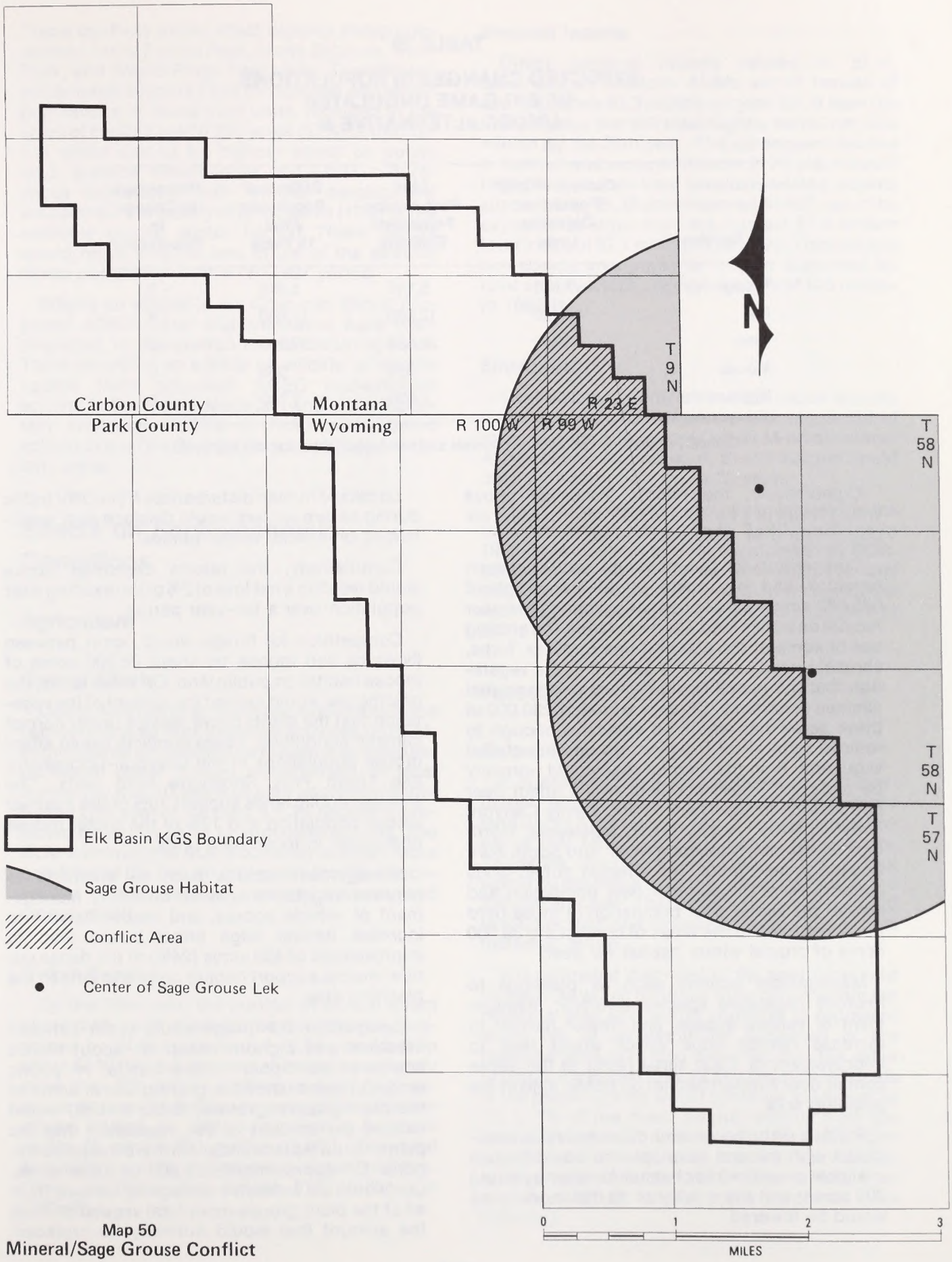
If severe enough, these conflicts may result in a decline in the health and reproductive ability of wild animals, a lessened ability of a wild population to recover from losses sustained during periods of severe winter weather, and may cause the movement of wild animals to less suitable ranges. This will result in the decline of big game ungulate populations over time. These conflicts would be more severe on parturition and crucial winter ranges, which are limited in area and are necessary for the maintenance of the big game animals. These conflicts would affect pronghorn populations in the Badger Basin, Carter Mountain, and Crystal Creek herd units, resulting in the loss of 2% of the existing pronghorn population. The affected public lands support 42% of the summer pronghorn population and 45% of the winter population in these herd units. The expected changes in populations of big game ungulates over a ten-year period under this alternative are shown in table 29.

Competition for forage would occur between livestock and elk on about 99,000 acres of the elk habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 34,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect elk populations in the Carter Mountain, Clarks Fork, Horse Creek, Northeast Bighorn, and North Fork Shoshone herd units. The affected public lands support 2% of the summer elk population and 7% of the winter elk population in those herd units. Included in the areas of conflict are 35,000 acres of the crucial winter habitat and parturition habitat for elk on public land.

Management actions such as plantings to improve vegetative species diversity, management of vehicle access, and timber harvest to increase habitat edge effect would lead to improvement of 5,900 acres (46%) of the dense conifer elk support habitat on public land in the planning area.

Surface disturbance and other activities associated with mineral development would reduce available elk crucial winter habitat by about 190 acres and reduce elk parturition habitat by about 80 acres. The quality of 9,900 more acres of elk crucial winter habitat and 6,500 more acres of elk parturition habitat would be lowered.

Localized human disturbances from ORV traffic would displace elk populations on crucial winter ranges and calving ranges and probably would cause mortalities.



Map 50
Mineral/Sage Grouse Conflict

TABLE 29

EXPECTED CHANGES IN POPULATIONS OF BIG GAME UNGULATES UNDER ALTERNATIVE A

Species	Current WGFD Population Objective Level	1984 Post-season Population Estimate	Estimated Population After 10 Years	Percentage of Change in Population[1]
Pronghorn	7,810	5,140	5,040	- 2
Elk	12,200	12,680	11,800	- 8
Deer	32,600	27,680	27,100	- 2
Moose	440	355	355	0
Bighorn sheep	2,820	2,830	2,740	- 3

[1] Comparison between population estimate and estimated population after 10 years.

Cumulatively, the effects discussed above would result in a net loss of 8% of the existing elk population over a ten-year period.

Competition for forage would occur between livestock and big game ungulates on about 620,000 acres of mule deer and white-tailed deer habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 230,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect deer populations in the Clarks Fork, Devils Canyon, Greybull River, Horse Creek, Meeteetse, North Fork Shoshone, Shoshone River, and South Fork Shoshone herd units. The affected public lands support 3% of the summer deer population and 10% of the winter deer population in those herd units. Included in the areas of conflict are 39,000 acres of crucial winter habitat for deer.

Management actions such as plantings to improve vegetative species diversity, management of vehicle access, and timber harvest to increase habitat edge effect would lead to improvement of 5,900 acres (46%) of the dense conifer deer support habitat on public land in the planning area.

Surface disturbance and other activities associated with mineral development would reduce available crucial winter habitat for deer by about 700 acres, and the quality of 30,000 more acres would be lowered.

Localized human disturbances from ORV traffic during severe winters would displace deer populations on crucial winter ranges.

Cumulatively, the effects described above would result in a net loss of 2% of the existing deer population over a ten-year period.

Competition for forage would occur between livestock and moose on about 26,000 acres of moose habitat on public land. On these lands, the grazing use would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. These conflicts would affect moose populations in the Greybull-Gooseberry and North Fork Shoshone herd units. The affected public lands support 10% of the summer moose population and 12% of the winter moose population in those herd units.

Management actions such as plantings to improve vegetative species diversity, management of vehicle access, and timber harvest to increase habitat edge effect would lead to improvement of 480 acres (24%) of the dense conifer moose support habitat on public land in the planning area.

Competition for forage would occur between livestock and bighorn sheep on about 46,000 acares of the bighorn sheep habitat on public land. On these lands the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 26,800 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced.

These conflicts would affect bighorn sheep populations in the Francs Peak, North Bighorn, Trout Peak, and Wapiti Ridge herd units. The affected public lands support 2% of the summer and winter populations in those herd units. Included in the areas of conflict are 10,300 acres (57%) of the crucial winter habitat for bighorn sheep on public land. Surface disturbances and other disturbances associated with mineral development would lower the quality of 3,100 acres (17%) of the available crucial winter habitat These effects would result in a net loss of 3% of the existing sheep population over a ten-year period.

Effects on wildlife in the Chapman Bench proposed ACEC under this alternative have been described in the section on candidate species. There would be no effects on wildlife or wildlife habitat from proposed ACEC management actions in the Carter Mountain and Little Mountain proposed ACECs or from management actions in the Five Springs Falls and Sheep Mountain areas.

Effects on Socioeconomic Conditions

Agriculture

General Effects

Under Alternative A, the economic effects in the two-county area from livestock activities on BLM-administered land should be the same as those experienced under current management, at least during the first 10 years of plan implementation. By the 20th year of the plan, a 1.3% decline is projected for AUMs on BLM-administered land. The BLM-administered AUMs currently support about one-third of the two-county area's total livestock-related output revenue, personal income, and employment.

Output Revenue

By the 20th year, the portion of annual direct two-county area livestock sector revenue supported by BLM-administered AUMs could drop about $310,000, but the total still would be slightly more than $23 million. Indirect and induced revenues also would decline, lowering total area revenues related to BLM-administered livestock AUMs to about $60 million (1.3%). The total annual two-county area revenue related to all livestock activities was almost $183 million in 1985-86.

Personal Income

Direct personal income related to BLM-administered livestock AUMs would remain at approximately $1.3 million per year for at least the first 10 years but still total slightly more than $23 million by the 20th year. The subsequent decline in indirect and induced income in 20 years would mean that annual total livestock-related income supported by BLM-administered AUMS would be expected to drop from the current $7.2 million level to about $7.1 million in 20 years. Total annual two-county area personal income supported by total area livestock activity was almost $23 million in 1985-86.

Employment

The two-county area's livestock sector directly employs about 1,546 workers with about 516 of these positions supported by BLM-administered AUMs. Under Alternative A, BLM's support could drop by eight positions in 20 years.

The total annual area employment related to the livestock sector was close to 2,640 positions in 1985-86, with about one-third supported by BLM-administered AUMS. By the 20th year, the total employment supported by BLM-administered AUMS could decline by 12 positions (from 879 to 867).

Forestry

Output Revenue

It is projected that annual harvesting of sawtimber and fuelwood from BLM-administered land under Alternative A would equal present levels of 500 MBF and 1,500 cords, respectively. Therefore, the direct sales value of this output would be expected to range between $12,000 and $20,000 annually. That estimate is based on a $10 to $20 per MBF saw timber price and a $5 per cord fuelwood return.

It is estimated that most of the sawtimber sold by the BLM would continue to be milled within the resource area and would continue to represent about 5% of all sawtimber harvested in the resource area. It is also expected that the value of timber harvested from BLM-administered lands in the planning area would continue to amount to 1% to 3% of the direct output revenue from the total forestry sector in the two-counties (Big Horn and Park). The two-county area's forestry sector is responsible for around $1.7 million of total area output revenue (direct plus indirect plus induced).

Personal Income

It is projected that personal direct income derived from the two-county area's entire forestry sector would continue to total slightly more than $380,000 per year, with $6,000 to $9,000 attributed to harvesting on BLM-administered land. When indirect and induced effects also are included, the area's forestry sector contributes about $472,000 to total area income, of which $7,000 to $11,000 would be the result of timber harvested on BLM-administered lands.

Employment

Harvesting activities related to BLM-administered land continue to support less than one work-year of total employment annually under this alternative. The two-county area's total forestry sector provides 29 to 30 fulltime workers with direct employment. This rises to about 35 workers when related indirect and induced employment is included.

Minerals

General Effects

The following socioeconomic analysis addresses only resource area oil and gas activities over time. Other minerals are not included because they accounted for less than 1% of the assessed value of area mineral output in 1984 and 1985 and are not expected to change meaningfully over the plan implementation period of 10 to 20 years.

Oil and gas output in the Cody Resource Area, including that from BLM-administered mineral estate, is projected to decline significantly over the next 10 to 20 years. Under present production methods, the total annual oil output in the area in 1998 is expected to be about 42% less than output in 1984, and the total annual gas output is projected to be only about one-fourth as large in 1998 as in 1984. These declines are expected to occur as the area oil and gas fields are further depleted. There is a chance that a proposed carbon dioxide pipeline could make possible some additional recovery of area oil through tertiary injection procedures over time, thus slowing the projected decline in output. However, there is no indication of when, or if, such injection procedures would be carried out, to which fields they would be applied, or how much residual oil such injections would yield. In addition, some wells have been shut in because of low oil prices in recent years. If these were reactivated in response to price increases, that change would help to slow the projected output decline to some extent.

Output Revenue

Because of the uncertainties related to world oil supplies and related price movements, it is difficult to estimate appropriate average oil and gas prices over time. However, reported per-unit prices were applied to 1984 and 1985 oil and gas output for this analysis. For 1986 and beyond, per-unit price estimates are based on the projections of various minerals specialists and minerals publications were applied.

It is estimated that the direct sales value of annual oil production in the resource area in 1998 will be about half that of 1984. This projection is based on an estimated price per barrel of $19.50 for area oil in 1998. This would be a drop in direct annual revenues of roughly $290 to $295 million below 1984 area revenues. About 50% to 55% of 1984 resource area oil revenues were from BLM-administered mineral estate oil output.

It is projected that annual resource area gas output value would total less than $5 million in 1998, or almost 70% below 1984 output value. Roughly half the resource area gas output value in 1984 was attributable to production from BLM-administered mineral estate.

At an estimated $270 to $275 million, the combined value of annual area oil and gas output in 1998 would be about 50% to 55% below the 1984 output value. This translates into a total (direct plus indirect plus induced) drop in annual area business activity of between $395 and $400 million by 1998.

Personal Income

The oil and gas sector of the resource area provided approximately $26 million in annual area direct personal income in 1984, with about 50% to 55% attributable to production from BLM-administered mineral estate. By 1998, the area's total annual direct personal income from the oil and gas sector is expected to have declined to slightly over $12 million. When income from the sectors supporting oil and gas activities are included, the estimated total gas and oil related personal income in 1998 would be about $20 million, or roughly $23 to $24 million less than in 1984.

Employment

The resource area's annual direct employment by the oil and gas sector in 1984 was about 965 work-years. It is projected that this would decline to fewer than 550 work-years annually by 1998. The addition of indirect and induced employment related to area oil and gas activities brings the

1998 annual total to roughly 1,700, which is between 40% and 45% below the 1984 annual level. More than half the resource area employment related to oil and gas in 1984 is attributed to BLM-administered mineral estate.

Recreation

Output Revenue

Currently, Park and Big Horn counties, jointly, provide about 1.3 million recreation visitor days (RVDs) annually. Assuming values would remain constant over time, this translates into almost $31 million worth of annual direct revenues from total area recreation over the life of Alternative A.

Recreation on BLM-administered land would be expected to continue to account for approximately 16% of the joint county area's total RVDs and related direct annual output revenue over the life of the plan under Alternative A. Consumptive recreational activities on BLM-administered lands would account for about 37% of the total RVDs on that land and contribute more than $3.6 million in direct annual area output revenues. By comparison, nonconsumptive recreational activities would contribute about $1.4 million in direct annual revenues.

When all impacts on revenues are considered, recreation on BLM-administered land would be expected to contribute about $10 million to annual area business activity under Alternative A. Total recreation in the two-county area adds about $60 million to the joint county area output revenue.

Personal Income

Recreation in the two-county area would continue to add about $6.7 million to that area's direct personal income annually under Alternative A. BLM-administered lands would account for about $1.1 million of that total. When indirect and induced effects are considered, total area recreation would be expected to contribute about $10.2 million annually to the area's personal income, with BLM-administered lands accounting for approximately 16% of it.

Employment

Total recreation in the two-county area supports about 527 work-years of direct employment plus about 242 indirect and induced positions, for a total of 769 positions per year. The BLM-administered lands under Alternative A would support about 87 work-years of recreation related direct employment, plus 40 indirect and induced positions for a total of 127 work-years annually.

Unavoidable Adverse Impacts

Cultural resources would be destroyed or altered by surface-disturbing activities, erosion, and vandalism.

Adverse effects on cultural resources would continue to occur from actions over which BLM has no discretion, trespass actions, illegal collection, vandalism, failure to recognize or report important sites, natural or accelerated erosion, and wildfire suppression activities.

Oil and gas production would continue to decline as existing fields became depleted.

Forage productivity would decline or remain static on allotments without AMPs.

There would be an annual accelerated soil loss of 2.6 million tons in addition to the natural soil loss of about 1.4 million tons.

Vegetative cover and productivity would be reduced for at least a short time after construction of range projects.

Vegetation would be lost on approximately 2 acres per mile of ORV use.

About 20% of all surface disturbances would cause permanent visual impacts.

Soil disturbances that cause erosion also would increase sediment delivery to surface water and reduce water quality. Approximately 10% of the soil loss caused by surface disturbances would be delivered to streams as sediment.

Any oil spill reaching surface water could make the water temporarily unsuitable for agricultural, municipal, industrial, wildlife, or recreational use.

Up to 5% of the riparian zones along perennial streams would drop into a lower value class and up to 5% of the riparian zones along intermittent/ephemeral streams would drop into unsatisfactory class.

Short-Term Uses versus Long-Term Productivity

The amount of produced water would decline through increases in the number of oil and gas wells shut in or plugged and abandoned and in the use of water injection wells and water floods. This would lead to a long-term reduction of surface water supplies and reduction of riparian habitat that is dependent on produced water.

Continuation of existing livestock stocking levels would cause forage available for livestock grazing to decrease by 1,029 AUMs after about 20 years.

Surface-disturbing activities would increase erosion, which reduces soil productivity by decreasing the volume of the root zone that holds water and nutrients for plants. Prolonged erosion on sites could transform relatively rich upland grass communities with deep soils into shallow-soiled woodlands or even rock outcrops, and fertile riparian areas could become barren.

Some effects on soils that would be comparatively small could have lasting effects on site productivity and the capability of the site to be reclaimed and revegetated. In most cases, the impacts would last for two or three years. Soil loss normally diminishes during the period following reclamation, but certain facilities such as oil and gas drill pads and established access roads would remain in place indefinitely.

Surface mining would cause soil erosion rates of up to 100 tons per acre per year during excavation. This rate could decline to near predisturbance levels in 5 to 20 years with reclamation. For abandoned and unrehabilitated mines, rates would persist at about 15 tons per acre per year. Soil contamination could result from placement or leaching of spoil piles, the use of toxic chemicals, the methods of equipment operation, and erosion from the site.

Surface reclamation and watershed manipulation activities would cause short-term soil losses on specific sites; however, these impacts would be insignificant and more than offset by long-term benefits.

Construction and fencing of new reservoirs would remove vegetation from about 10 acres per reservoir. However, each reservoir would create two to three acres of wetland habitat, store up to 20 acre-feet of water, improve livestock and wildlife distribution, and improve forage utilization in areas previously without water.

Discharge of produced waters could carry accumulations of dissolved solids such as iron sulfate. Such solids precipitate out and accumulate in stream channels, affecting channel characteristics long after produced water discharges cease.

Irreversible and Irretrievable Commitment of Resources

Any vandalism or unintentional destruction of cultural resources would be irreversible and irretrievable.

Oil and gas production would continue to decline as existing fields became depleted.

The quality of recreational and educational experiences related to caves would be lowered in the long term by vandalism, long-term use of fragile cave resources, improved access, and increased use due to public knowledge of cave locations.

Access provided by oil and gas activities, timber harvest, and range developments would open previously inaccessible areas to motorized recreation, increasing surface disturbance and ORV activity. The increased traffic would lower the quality of the recreational experience of those who enjoy solitude. Recreation opportunities would become irreversibly committed to more developed and vehicle-dependent recreation opportunities. This would reduce opportunities for primitive recreation experiences.

The annual accelerated erosion of about 2,647,800 tons of soil would cause a cumulative loss in upland soil productivity. About 10% of this soil would be lost as sediment to the streams that drain the planning area. Soil compaction would reduce effective moisture infiltration and soil productivity. The rehabilitation potential on upland sites would be reduced as a result of this soil loss.

Disposal of hazardous waste would contaminate and could permanently destroy soils and vegetation, increasing localized soil loss.

Some surface-disturbing activities in the planning area would cause long-term or permanent changes in the natural landscape. Most of this would be near landscapes that have already been altered.

ALTERNATIVE B

Introduction

Under Alternative B, the level of land use restrictions generally would be fewer than under Alternative A, and the development and use of natural resources would be emphasized. More intensive management would be provided for forest resources, recreation, and livestock grazing than under Alternative A. The general cause and effect relationships between management actions and environmental consequences described for Alternative A also would exist for Alternative B. The impacts described below reflect the differences in impacts between Alternative A and Alternative B.

Effects on Resources

Air Quality

Alternative B would provide for more prescribed burning. This would increase the smoke and dust in the air; however, only acceptable reductions in air quality would be expected.

Cultural Resources

Because ORV use would be limited to existing roads and trails under Alternative B, effects on cultural resources from vandalism, soil erosion, and sedimentation would be less severe than those of Alternative A.

Full suppression of wildfire under Alternative B would be practiced on roughly one-fourth as much area as under Alternative A. In other areas, limited suppression would be practiced or restrictions would be placed on the use of heavy equipment. This would reduce potential adverse effects on cultural resources by limiting the modification of the ground surface by heavy equipment.

No significant cultural resources are known to be on lands potentially suitable for public sale; therefore, no significant adverse effects on cultural resources would be expected to result from possible sale of public lands. Any significant cultural resources on these lands probably would be discovered in site-specific investigations that would be conducted during evaluation of sale proposals. In such cases, effects would be mitigated by appropriate wording in the patent, or the sale could be denied if necessary.

Termination of some BOR withdrawals and C&MU classifications would make possible such land uses as locatable mineral development or desert land entry on lands where those activities formerly were prohibited, but these surface-disturbing activities would not be expected to have adverse effects on cultural resources. No significant cultural resources are known to be on lands where new surface-disturbing activities would be expected to occur.

Increased opportunities for resource development might create more access to cultural resources. This could result in a higher rate of inadvertent destruction of cultural resources or intentional destruction through activities such as vandalism. However, it also could result in the discovery of additional sites because Class III inventories are required before surface disturbing activities can begin.

The level of unintentional damage to cultural resources from ORV use would be lower in all proposed ACECs under Alternative B than under Alternative A because ORV use would be restricted to existing roads and trails.

Because the Chapman Bench proposed ACEC would not be closed to locatable minerals activities and only half the area would be designated an ACEC, there would be less protection from locatable minerals exploration and development than under Alternative A.

In parts of the Chapman Bench proposed ACEC and in the Sheep Mountain Anticline area, the use of limited wildfire suppression techniques would reduce the possibility of unintentional damage to cultural resources.

Because the Sheep Mountain Anticline area would not be designated an ACEC under Alternative B, cultural resources would have less protection under regulations that relate to mining claim development.

Forestlands

None of the stands on the timber production base would be managed for overmature characteristics under Alternative B. All the 7,700 acres that are classified as available for timber production would be managed on a 120-year rotation. Approximately 2,100 acres of forestland not in the base would be left to become overmature. The acreage that is actually overmature timber at any time would be about 1,000 acres less than under from Alternative A.

The harvest level would be about 60% greater under this alternative than under Alternative A, so that a total of about 800 MBF per year would be placed on the local market. Under such regulations, the productivity of the timber production base would increase.

The increase in harvest activity and slash would increase the risk of fire. However, the risk of fire would be reduced over the long term because rates of fuel loading would be lower.

Under Alternative B, no significant adverse effects on timber resources would be expected from possible public sale of lands or from removal of withdrawals and other land use segregations.

Geology and Minerals

Restrictions on oil and gas leases under Alternative B would be less severe than under Alternative A. For example, restrictions to protect sage grouse habitat and seasonal wildlife habitat would be dropped within 2 miles of the KGSs.

However, very little change in the amount of drilling activity would be expected (see table 3 in chapter 2).

The surface disturbance restriction within 0.5 mile of portions of the Shoshone River and Clarks Fork of the Yellowstone River would be replaced by the standard 500-foot restriction. This would make available for exploration and development 19,000 more acres (13,000 acres is in the high potential area).

Surface disturbance would be allowed in peregrine falcon recovery habitat areas. This would make 9,000 more acres in six locations available for drilling. Approximately one-third of this is in an area with high potential for hydrocarbons.

The removal of seasonal restrictions within 2 miles of KGS boundaries for both grouse habitat areas and big game seasonal range areas would result in year-round availability of 216,000 more acres. Of the additional land, 91% is in a high potential area, 8% in moderate, and 1% in low.

A restriction on surface-disturbing activities on approximately 1,300 acres in black-footed ferret essential habitat could require directional drilling, which would increase the cost of exploration or development in the area. The ferret habitat is in an area with high hydrocarbon potential.

The possible sale of public lands under section 203 of FLPMA could cause limited adverse effects on mineral development. On lands that are prospectively valuable for oil and gas and other mineral resources, the surface could be sold, but in most cases the mineral estate would be retained in public ownership. This could affect the cost of mineral development to some extent by creating "split estate" lands. Potential mineral developers would then need to negotiate with the new surface owners as well as with the BLM, and the development costs could be increased. These adverse effects would be greatest on lands in existing oil and gas fields. It is also possible that previously unexplored lands containing unknown mineral values would be disposed of. If the mineral estate was sold, the government would lose royalties; if the surface was sold, causing "split estate" lands, the cost of mineral development probably would increase.

The removal of segregations on some BOR-withdrawn and C&MU classified lands would make more land available for locatable mining activity. Bentonite mining would occur on previously undisturbed areas with high value bentonite resources, especially in areas north of Cowley. This would have an economically beneficial effect on the bentonite mining industry. Because the high quality deposits are large and the processing plants in Lovell are nearby, development costs would be relatively low. Therefore, the sites would be mined soon after they became available.

In the Chapman Bench and Little Mountain proposed ACECs and in the Five Springs Falls and Sheep Mountain Anticline areas, the effects on oil and gas exploration and development under Alternative B would be the same as those described for Alternative A.

In the Carter Mountain proposed ACEC, adverse effects on exploration and development would be fewer because of the less restrictive slope limitations. About 4,300 acres would be available for exploration and development under this alternative. This could result in more oil and gas exploration on the mountain and reduce the costs of exploration and production.

Because locatable mineral segregations would be removed in the Chapman Bench proposed ACEC and in the Five Springs Falls area, locatable mineral exploration could increase compared to Alternative A. However, no effects on locatable mineral development or production would be expected in these areas, in the Carter Mountain and Little Mountain proposed ACECs, or in the Sheep Mountain Anticline area.

Livestock Grazing

The quality and quantity of forage production under Alternative B would be greater than under Alternative A because more grazing treatments and range improvement projects would be implemented. An overall long-term increase of 15,681 AUMs above existing use would result from a short-term increase in stocking levels of 12,999 AUMs in 61 allotments and from long-term AUM gains produced by intensive management (see the table showing proposed stocking levels in appendix G). Forage condition and available forage would be increased over a period of 10 to 20 years through management practices proposed under Alternative B.

The management actions that would lead to the improvements described above would be rest-rotation grazing systems, spring deferment of grazing, prescribed burning, contour furrowing, chemical spraying, and seeding techniques such as "rip and seed," burn and reseed, and interseeding.

Effects from structural projects would be improved livestock distribution, reduction or deferment of grazing on wetland/riparian areas, development of new riparian sites, and provision of additional water sources for wildlife and domestic livestock. Projects that would be carried out to achieve these effects would be 20 reservoirs, 2

spring developments, 6 wells, and 26 miles of pipeline (see appendix G).

Development of boundary fencing and cross-fencing in five allotments would make possible the establishment of rest-rotation and spring deferment grazing systems and would prevent drifting of livestock and wild horses.

Short-term impacts associated with implementation of management actions and development of projects and treatments would vary among operators, depending on individual circumstances. Rest periods and rotational systems would be required after vegetative treatments to achieve maximum results. This could require operators to obtain additional rangeland during the suggested rest periods or to reduce herd sizes in the interim.

Plant vigor and productivity would be restored in key forage species because spring use would be modified or deferred in 10 to 15 allotments. This would result in an improvement in overall range condition and vegetative diversity in allotments on which use historically has been heavy during the critical spring growing period.

The condition and productivity of riparian areas now in a downward trend would improve after development of off-site water sources and construction of fencing to restrict livestock access to these zones. Seeding projects around existing reservoir sites would restore riparian communities and reduce sedimentation and erosion.

Conflicts between wildlife and livestock generally would be resolved in favor of livestock under this alternative. Reduction or relocation of big game ungulates would be necessary to provide space and forage requirements for livestock. Reductions in the numbers of existing wildlife and in wildlife population objectives would be negotiated between the BLM and the WGFD.

Reduction of wild horse numbers in the McCullough Peaks herd management area would make available 375 additional AUMs for livestock grazing and would reduce existing conflicts between livestock and the wild horse herd.

No significant adverse effects on livestock grazing would be expected under this alternative from possible sales of public land or from termination of BOR withdrawals. Livestock grazing would continue on federal lands that could be transferred to BLM administration, and the BLM would honor all grazing agreements between the BOR and individual livestock operators.

Recreation

Recreational use in the planning area would increase by 162,420 recreation visitor days (RVDs) under Alternative B through improved access and promotion of recreation opportunities. The changes in annual recreation use are displayed in table 30. The increase reflects 42,000 RVDs on lands that would be transferred from BOR administration to BLM administration through termination of BOR withdrawals. Placement of interpretive signs along the travel corridor to Yellowstone National Park would account for 55,000 RVDs. The remaining 65,500 RVDs would result from addition of facilities, placement of directional signs, improved access to rivers, reservoirs, and mountain slopes, and natural growth in recreation.

Increases in minerals activities and timber harvest would open access to many areas that were previously inaccessible. This would decrease the areas for semiprimitive nonmotorized activities and increase the roaded natural areas, as shown in table 31. These newly accessible areas would replace some hunting opportunities that would be lost or reduced under this alternative through intensive resource development.

Conflicts could occur between rafters and hunters or between ORV users and horseback riders. Because recreational facilities would not be constructed at recreation sites under this alternative, the sites could be abused to a point where they would be used infrequently.

At least one recreation site could be destroyed through surface disturbance associated with oil and gas activities. Especially susceptible are Rainbow Canyon, the Bentonite Hills ORV play area, and Newton Lakes. While sand and gravel operations could disturb river tracts, proper reclamation would provide opportunities for additional sites such as boat ramps, parking areas, and picnic sites.

Because restrictions on minerals activities would be less stringent under Alternative B, there would be more risk than under Alternative A that caves would be penetrated during mining or drilling operations. This could lead to destruction of caverns, alteration of microclimes, introduction of pollutants, changes in aesthetics, and possible closing of passages. Such effects would lower the quality of the recreation experience available.

Designation of ORV play areas under this alternative would increase RVDs by 20%. In other areas, limitation of ORVs to existing roads and trails would have little effect on 90% of the ORV use; there would still be ample opportunities for ORV experiences. Closing of areas around shooting ranges to ORV use, while necessary to protect the public, would reduce the size of the Bentonite Hills ORV play area.

No significant adverse effects on recreational opportunities would be expected because of pos-

TABLE 30

CHANGES IN ANNUAL RECREATION USE UNDER ALTERNATIVE B

Activity	West Slope Special Recreation Management Area		Bighorn River Special Recreation Management Area		Cave Special Recreation Management Area[1]		Historic Trails Special Recreation Management Area		Cody Extensive Recreation Management Area[2]		Total Recreation Use	
	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change
Water-based uses	0	0	1,400	+75	0	0	0	0	4,200	+425	5,600	+250
Fishing, hunting & trapping	50,800	+20	25,500	+5	0	0	0	0	43,650	+208	119,950	+50
Off-road vehicle use	1,600	-15	600	0	0	0	0	0	3,200	+60	5,400	+20
Cave use	10	-40	10	-75	2,000	+123	0	0	50	-50	2,070	+97
Sightseeing and other recreation	65,950	+45	32,500	+30	0	0	1,000	0	146,600	+150	246,050	+85
Total Use	**118,350**	**32**	**60,010**	**+19**	**2,000**	**+123**	**1,000**	**0**	**197,700**	**+165**	**379,070**	**+75**

Note: Columns headed "% Change" show percentage of change from Alternative A that would occur under Alternative B.

[1] Figures for Cave SRMA indicate only the underground use of caves. Recreation use taking place on the surface is included in West Slope SRMA or Cody Extensive Resource Management Area.

[2] Includes some BOR withdrawn lands.

TABLE 31

RECREATION OPPORTUNITIES UNDER ALTERNATIVE B AND CHANGE FROM ALTERNATIVE A

Type of Recreation	West Slope Special Recreation Management Area		Bighorn River Special Recreation Management Area		Cave Special Recreation Management Area		Cody Extensive Recreation Management Area		Totals	
	Acreage	% Change	Acreage	% Change	Acreage	% Change	Acreage	% Change	Acreage	% Change
Semiprimitive nonmotorized	1,220	0	0	0	0	0	28,500	-43	29,720	-4
Semiprimitive motorized	139,200	-4	17,950	-3	1,200	0	1,163,900	-3	1,322,250	-3
Roaded natural	12,800	+87	23,500	+2	0	0	488,280	+3	524,630	+14
Rural	12,080	0	500	0	0	0	393,820	0	406,400	0
Total	**165,300**	**0**	**42,000**	**0**	**1,200**	**0**	**2,074,500**	**0**	**2,283,000**	**0**

Note: Columns headed "% Change" show percentage of change from Alternative A that would occur under Alternative B.

sible sale of public lands under this alternative, provided easements could be maintained or established for public access across the patented lands. Significant caves or other important recreational resources that may be present on these lands probably would be discovered in site-specific investigations that would be conducted during evaluation of sale proposals. In such cases, effects on those resources would be mitigated by appropriate wording in the patent, or the sale could be denied if necessary.

The termination of some BOR withdrawals and C&MU classifications would make possible such land uses as locatable mineral development or desert land entry on lands where those activities formerly were prohibited. The Newton Lakes area is the only known significant recreational resource on lands where new surface-disturbing activities would be expected. That popular fishing and boating area could be affected by location of claims for building stone, bentonite, or gypsum if segregations were removed. Mining claim development activities would be incompatible with existing recreational opportunities in that area.

Recreation use in the Carter Mountain proposed ACEC would increase to about 2,500 RVDs per year under Alternative B. The proposed ACEC would not be protected from degradation by limitation of ORV use to existing roads and trails because the number of visitors would increase.

Effects on recreation opportunities in the Chapman Bench proposed ACEC and in the Five Springs Falls area generally would be the same as those described for Alternative A.

Recreation use in the Little Mountain proposed ACEC would increase to about 1,500 RVDs annually because of the establishment of visitor services, construction of facilities, and use of directional and interpretive signing. Cave use would make up 60% of this increase; hunting, fishing and sightseeing would account for the rest. Caves would not be protected from possible degradation by limitation of ORV use to existing roads and trails.

Recreation use in the Sheep Mountain Anticline area would increase to approximately 3,500 RVDs per year under this alternative. Interpretive facilities such as a visitor center, improved roads, and directional signing would provide for 50% of the use. The remaining 50% of the use would be associated with activities such as fishing, hunting, boating, and ORV use.

Soils

Under Alternative B, accelerated erosion would increase by 600,300 tons per year in the short term but decrease by 589,800 tons in the long term (see table 32). Most of the differences would result from changes in recreation and grazing activities. Reductions in use of off-road areas for recreation as a result of ORV limitations would decrease soil losses by almost 244,000 tons per year. Grazing use would increase in the short term, degrading vegetative condition, compacting vulnerable soils, and increasing erosion by almost 839,000 tons per year. In addition, range project construction would more than triple the annual soil disturbance. However, impacts from grazing would decrease in the long term after improved vegetative condition reduced annual erosion by about 352,000 tons from current levels.

Increased harvest levels in forest management under Alternative B would more than double soil erosion. The effects on soils from other activities would be relatively unchanged from those described for Alternative A.

Under Alternative B, soil losses on about 425 acres in the Carter Mountain proposed ACEC would be caused by surface-disturbing activities such as oil and gas exploration and development related to removal of the 7% slope restriction. Soil losses would increase in the Chapman Bench proposed ACEC because of management actions to improve long-billed curlew and mountain plover habitat through reduction of vegetative height and density by livestock grazing. In the Little Mountain proposed ACEC and in the Five Springs Falls and Sheep Mountain Anticline areas, soil impacts would result from exploration and development of leasable and locatable minerals, livestock grazing, right-of-way construction, and ORV use. The level of these impacts would be reduced somewhat from the level of Alternative A because of limitation of ORV use to existing roads and trails.

Vegetation

Short-duration forest management activities such as road building and skidding would affect vegetation on 1,007 acres over a ten-year period under Alternative B. Each area would be fully reclaimed within three to five years after the disturbance. Long-duration forestry activities would reduce plant species and age class diversity on 800 acres.

Wild horse numbers would be maintained at a level that would stabilize current range conditions in most of the McCullough Peaks herd area. No improvement in condition would be expected on 43,348 acres in the herd area, but vegetation would be improved by at least one condition class on 23,034 acres through natural regeneration, range improvement projects, and intensified grazing management.

TABLE 32
ESTIMATED SOIL LOSS UNDER ALTERNATIVE B

Resource Use or Activity	Total Soil Loss under Alternative A (tons per year)	Total Soil Loss under Alternative B (tons per year)	Percentage of Change	Soil Units Most Affected
Recreation	460,700	216,700	-53	B2, B5, B6
Range projects	1,600	6,000	+275	B3, B6
Grazing	1,925,000			
(short-term)		2,763,800	+44	B2, B3
(long-term)		1,573,700	-18	B2, B3
Minerals activities	224,700	224,700	0	B2, B6
Forest management	700	2,200	+214	M1
Lands and realty	24,600	24,600	0	B3, B6
Access	7,200	7200	0	B2, B3, B6
Fire management	800	400	-50	B2, B6
Cultural resources	2,500	2,500	0	B3, B2
Total accelerated erosion	**2,647,800**			
(short-term)		**3,248,100**	**+23**	**B2, B3, B6**
(long-term)		**2,058,000**	**-22**	**B2, B3, B6**
Estimated natural erosion	1,420,000	1,420,000	0	B2, B3, B6
Total erosion	**4,067,800**			
(short-term)		**4,668,100**	**+15**	**B2, B3, B6**
(long-term)		**3,478,000**	**-14**	**B2, B3, B6**

Under this alternative, range management activities (development of range projects and use of grazing systems) would result in an upward trend in range condition on 194,500 acres. After 20 years, range condition ratings in the parts of the planning area that have been inventoried would be 28% poor, 15% fair, 36% good, and 4% excellent.

Range project construction would cause a short-duration removal of vegetation on 194,707 acres but would improve vegetation by at least one condition class on these lands after 20 years.

Limitation of ORV use to existing roads and trails under this alternative would result in fewer effects on plant communities than under Alternative A.

An upward trend in vegetation on 3,233 acres would be expected in ten years under this alternative through wildlife management activities such as manipulation of vegetation to increase plant species diversity and protective fencing to prevent overuse of forage in riparian areas. Vegetation types in which the upward trend would be expected are riparian areas, greasewood, and mountain shrub.

The possible sale of public lands under this alternative would have no significant adverse effects on vegetative resources. No significant rare plants are known to exist on lands identified as potentially suitable for disposal. Any significant vegetative resources on these lands probably would be discovered in site-specific investigations that would be conducted during evaluation of sale proposals. In such cases, effects on vegetation would be mitigated by appropriate wording in the patent, or the sale could be denied if necessary.

No significant adverse effects on vegetation would be expected under this alternative from termination of BOR withdrawals and C&MU classifications.

Contour furrowing would be carried out in the salt shrub vegetation type, interseeding and ripping in the grassland vegetation type, and burning, "burn and seed," and chemical brush control in sagebrush, sagebrush/grass, mixed shrub, greasewood, and juniper vegetation types. This would cause impacts on soils and water quality, and the vegetation type could change in these areas.

Range projects involving vegetative manipulations such as seeding, burning, ripping, and contour furrowing would improve current range condition on the treated areas from poor or fair to at least good condition after treatment.

Effects on vegetation from activities in minerals, R&PP uses, and desert land entries would be the same as those described for Alternative A.

No effects on vegetation would be expected under Alternative B from management actions in the Carter Mountain and Little Mountain proposed ACECs or in the Five Springs Falls and Sheep Mountain Anticline areas. In the Chapman Bench proposed ACEC, range condition would remain unsatisfactory because of management actions to maintain a low vegetative height through livestock grazing so that the quality of habitat for long-billed curlews and mountain plovers could be maintained or improved.

Visual Resources

Effects on visual resources under Alternative B would be the same as those described for Alternative A. The effects on visual quality in the Carter Mountain, Chapman Bench, and Little Mountain proposed ACECs and in the Five Springs Falls area would be the same as those described for Alternative A. Visual quality in the Sheep Mountain Anticline area would decline because of continued locatable minerals mining and exploration activity and because ORV limitations would not protect the area from degradation due to increases in the number of visitors.

Water Resources

Under Alternative B, salt loadings would gradually decrease as oil and gas production declined. This would result in a gradual improvement in the water quality of receiving perennial streams. If produced water made up most of the flow, there would be a loss of aquatic habitat commensurate with reductions in produced water discharges.

Annual suspended sediment loads would increase from the present rates by 52,600 tons (13%) in the short term. Table 33 illustrates sediment loads that would be generated by each drainage basin under this alternative. Deterioration of range condition on some "I" category allotments would increase sediment loads in the short term by 81,500 tons (20%). This increase would be partially offset by sediment reduction of 24,680 tons (96%) associated with restrictions on recreation and ORV use. Sediment loads caused by all other surface-disturbing activities would essentially remain unchanged or decrease slightly. In the long term (more than ten years), sediment loads would gradually decrease from the existing level by 60,610 tons (15%) as range and watershed conditions gradually improved through implementation of range projects and grazing systems.

No significant adverse effects on water resources or water quality would be expected to result from possible sale of public lands or from termination of some BOR withdrawals and C&MU classifications.

Wetlands

Under Alternative B, wetlands would increase in area and improve in quality. Most expansion and improvement would result from livestock grazing management, including implementation of grazing treatments, creation of wetland/riparian pastures, and construction of new water development projects. In addition, wetlands would be improved through maintenance of reservoirs and implementation of watershed and habitat improvement projects on streams, reservoirs, and springs.

Wetlands in the wild horse herd areas would be improved by the reduction of the horse population to 75 animals in one herd. Restriction of ORV use to existing roads and trails would reduce erosion from uplands and minimize direct effects on wetlands.

Minor adverse effects on wetlands could occur under this alternative from improvement of access to some streams and reservoirs and from reduction of buffer zones along the major rivers from 1 mile to 500 feet.

No significant wetland resources are known to be on lands potentially suitable for public sale; therefore, no significant adverse effects on wetlands would be expected to result from possible sale of public lands. Any significant wetlands resources on these lands probably would be discovered in site-specific investigations that would be conducted during evaluation of sale proposals. In such cases, effects on wetlands would be mitigated by appropriate wording in the patent, or the sale could be denied if necessary.

Termination of some BOR withdrawals and C&MU classifications would not be expected to have adverse effects on wetlands.

The overall effects on wetlands that could be expected under this alternative would be an improvement in condition on about 10% of the stream miles. Those areas could be expected to improve by at least one condition class within the next ten years. More reservoir habitat would be created and wetlands would improve significantly faster under Alternative B than under Alternative A.

TABLE 33

ESTIMATED SHORT-TERM AND LONG-TERM SEDIMENT LOADING UNDER ALTERNATIVE B

Drainage	Existing Sediment Loading (tons per year)	Short-term		Long-term	
		Sediment Loading (tons per year) Years 1 through 10	Percentage of Change	Sediment Loading (tons per year) More Than 10 Years	Percentage of Change
Bighorn River Subbasin					
Dry Creek	10,8	13,720	+27	9,080	-16
Shell Creek	7,400	8,480	+15	5,930	-20
Greybull River	15,800	15,550	- 2	15,070	- 5
Miscellaneous tributaries	60,000	78,750	+31	48,410	-19
Shoshone River	262,000[1]	290,930[2]	+11	223,480[3]	-15
Bighorn River Subbasin subtotal	356,000	407,430	+14	301,970	-15
Clarks Fork of Yellowstone Subbasin					
Big Sand Coulee	10,000	10,100	+ 1	7,740	-23
Miscellaneous tributaries	44,900	45,970	+ 2	40,580	-10
Clarks Fork of Yellowstone Subbasin subtotal	54,900	56,070	+ 2	48,320	-12
Planning area total	**410,900**	**463,500**	**+12**	**350,290**	**-15**

[1] Of this, 32,100 tons per year come from Whistle Creek.

[2] Of this, 37,920 tons per year come from Whistle Creek.

[3] Of this, 26,530 tons per year come from Whistle Creek.

Wild Horses

The wild horse population in the McCullough Peaks herd area would be reduced to 75 animals under Alternative B. This would decrease conflicts between horses and other resource uses and values. This population, a 25% decrease from the present population, represents the number of animals that existed before the passage of the Wild Horse and Burro Act in 1971. The reduction in horse population would provide 375 additional AUMs in four allotments for wildlife and livestock use. The population level of 75 animals would greatly reduce the available genetic pool and cause changes in the existing herd characteristics.

Any range project designed to benefit soils, watershed, wildlife, or livestock would also benefit wild horses. These projects would provide additional water sources and forage, allowing horses to utilize a greater portion of the McCullough Peaks herd area without excessive trailing.

No significant adverse effects on wild horses would be expected to result from possible sale of public lands or from termination of some BOR withdrawals and C&MU classifications.

Wildlife and Fish Habitat

Fisheries

Fisheries habitat would improve significantly under Alternative B from implementation of new AMPs throughout the planning area. With implementation of improved grazing systems and creation of wetland/riparian pastures, streamside vegetation would proliferate, and erosion and peak runoff from uplands would be reduced. As these actions caused channels to narrow and banks to stabilize, yearlong fish habitat would develop in association with improved bank cover, deeper pools, and cleaner spawning gravels.

Construction of many new water development projects would attract livestock away from stream zones, resulting in additional improvements. Projects implemented for the benefit of watershed and wildlife would improve stream habitat conditions for fish, as would limitation of ORV use to existing roads and trails.

Construction of some large reservoirs and significant efforts to extend the life of existing fishery reservoirs would result in an increase in reservoir fisheries.

Increased visitation resulting from improvement of access to some streams and reservoirs might cause minor adverse effects. However, potential problem areas would be managed to improve fish habitat.

The downward trend in stream habitat condition would be reversed within ten years under this alternative. About 10% of the stream miles would be improved by at least one condition class. Overall, fish habitat would improve more and faster under Alternative B than under Alternative A.

No significant fisheries are known to be on lands potentially suitable for public sale; therefore, no significant adverse effects on fisheries would be expected to result from possible sale of public lands. Any significant fisheries resources on these lands probably would be discovered in site-specific investigations that would be conducted during evaluation of sale proposals. In such cases, effects on fisheries would be mitigated by appropriate wording in the patent, or the sale could be denied if necessary.

The possible sale of public lands would not be expected to have any adverse effects on fisheries, nor would termination of some BOR withdrawals and C&MU classifications.

Wildlife Habitat

Terrestrial Habitats and Animal Communities. Table 34 summarizes the effects on wildlife habitat from Alternative B.

The impacts of recreational activities in wetland habitats and the application of chemicals to control noxious weeds and insects would be the same as those described for Alternative A.

Production and Recovery Habitat for Endangered Species. The effects on ferret recovery habitat from mineral development under Alternative B would be the same as those of Alternative A. Vegetative treatments from livestock management under this alternative would cause the modification or loss of about 1,800 acres (13%) of recovery habitat during the next ten years; the effects on ferret recovery are undetermined.

Within ten years, three nesting pairs of American peregrine falcons would be expected to occupy three of the six recovery areas in the planning area. This would be made possible by reintroduction of 30 to 60 peregrine falcons. However, human intrusions and other disturbances from oil and gas field development would prevent peregrine falcon nesting in one recovery habitat area (580 acres).

The construction and improvement of roads and the construction of aboveground power lines

TABLE 34
EFFECTS ON WILDLIFE HABITAT UNDER ALTERNATIVE B

Type of High Value Habitat	Continued Decline in Both Short Term and Long Term (acreage)	Continued Decline in Short Term; Improvement in Long Term (acreage)	Improvement or No Change in Both Short Term and Long Term (acreage)
Forestlands		6,470	6,330
Endangered species production and recovery habitat			
Black-footed ferret	1,890		12,100
Bald eagle	170	30	660
American peregrine falcon	3,080		5,920
Candidate species production and recovery habitat			
Mountain plover	180	450	14,700
Long-billed curlew	180	450	14,700
Swainson's hawk	7,225	4,500	8,775
Swift fox		5,130	8,870
Waterfowl production habitat	5		
Sandhill crane staging habitat		900	
Raptor production habitat	920	133,800	31,000
Sage grouse production habitat	1,990	127,000	439,000
Big game ungulate support, winter, and parturition habitat			
Pronghorn	225,000	287,000	569,000
Elk	49,300	85,400	29,100
Mule deer	270,700	344,900	323,400
Moose	26,000		25,000
Bighorn sheep	26,800	22,300	42,000

Note: This table displays quantifiable impacts only. See the narrative for the complete impact analysis.

could cause adverse effects on falcon recovery in two recovery areas (2,500 acres). Disturbances from timber harvest activities during the nest site selection period could stop falcon nesting in one recovery area during the period of timber harvest.

Production and Recovery Habitats for Candidate Species. The effects on long-billed curlew and mountain plover from mineral development, road and power line construction, ORV use, and habitat improvement would be the same under Alternative B as those described for Alternative A.

The effects of Alternative B on Swainson's hawk and ferruginous hawk would be the same as those of Alternative A except that vegetative treatments for livestock management would cause the modification or loss of about 1,800 acres (13%) of prey base habitat.

The effects on swift fox habitat from oil and gas activity would be the same under Alternative B as under Alternative A. In addition, vegetative treatments for livestock management would cause modification or loss of about 1,800 acres (13%) of swift fox recovery habitat.

Prey species populations on 2,500 acres (18%) of swift fox recovery habitat would increase through implementation of the *Prairie Dog Ecosystem Habitat Management Plan* (USDI, BLM 1986c). This would benefit the recovery effort.

Production and Staging Habitats for Waterfowl and Water Birds. The impacts on waterfowl and water birds from Alternative B would be the same as those of Alternative A.

Raptor Production Habitat. Effects on raptor habitat from Alternative B would be the same as those of Alternative A except that vegetative treatments for livestock management could cause the modification or loss of about 21,000 additional acres (11%) of raptor production habitat, about 1,800 acres (13%) of prairie dog (prey base) habitat, and about 90,000 acres (16%) of sage grouse (prey base) production habitat.

Grouse Production Habitat. Impacts from oil and gas, bentonite mining, ORV use, chemical treatment of noxious weeds, and the use of insecticides under Alternative B would be the same as those from Alternative A. Vegetative treatments for livestock management would cause the modification or loss of about 90,000 acres (16%) of the sage grouse production habitat that exists on public land and would cause abandonment of five strutting grounds.

Habitat for Big Game Ungulates. Competition for forage would occur between livestock and pronghorn on about 512,000 acres of the pronghorn habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 225,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect pronghorn populations in the Badger Basin, Carter Mountain, and Crystal Creek herd units. The affected public lands support 49% of the summer pronghorn population and 52% of the winter pronghorn population in those herd units. Within ten years, this could result in a net loss of 3% of the existing pronghorn population (see table 35).

TABLE 35

EXPECTED CHANGES IN POPULATIONS OF BIG GAME UNGULATES UNDER ALTERNATIVE B

Species	WGFD Population Objective Level	Population Estimate	Estimated Population After 10 Years	Percentage of Change in Population[1]
Pronghorn	7,810	5,140	4,900	- 3
Elk	12,200	12,680	11,200	- 13
Deer	32,600	27,680	26,200	- 5
Moose	440	355	355	0
Bighorn sheep	2,820	2,830	2,740	- 3

[1] Comparison between population estimate and estimated population after 10 years.

Competition for forage would occur between livestock and elk on about 122,000 acres of the elk habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 49,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect elk populations in the Carter Mountain, Clarks Fork, Horse Creek, Northeast Bighorn, and North Fork Shoshone herd units. The affected public lands support 2% of the summer elk population and 9% of the winter elk population in those herd units. Included in the areas of conflict are 35,000 acres of the crucial winter habitat and parturition habitat for elk on public land.

The effects on elk from minerals activities and ORV use under Alternative B would be the same as those described for Alternative A.

Cumulatively, the effects discussed above would result in a net loss of 13% of the existing elk population over a ten-year period.

Competition for forage would occur between livestock and big game ungulates on about 579,000 acres of mule deer and white-tailed deer

habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 270,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect deer populations in the Clarks Fork, Devils Canyon, Greybull River, Horse Creek, Meeteetse, North Fork Shoshone, Shoshone River, and South Fork Shoshone herd units. The affected public lands support 3% of the summer deer population and 9% of the winter deer population in those herd units. Included in the areas of conflict are 39,000 acres of crucial winter habitat for deer.

The effects on deer from minerals activities and ORV use under Alternative B would be the same as those described for Alternative A.

Cumulatively, the effects described above would result in a net loss of 5% of the existing deer population over a ten-year period.

The impacts on moose and bighorn sheep from Alternative B would be the same as those under Alternative A.

Effects on Socioeconomic Conditions

Agriculture

General Effects

Of all the proposed alternatives, Alternative B would yield the highest number of allowable BLM-administered livestock AUMs as well as the highest resulting output revenue, personal income, and employment. It is assumed for this analysis that the area livestock sector could expand its activities in proportion to the increase in BLM-administered livestock AUMs. Therefore, by the tenth year, BLM-administered livestock AUMs and resulting output revenue, personal income, and employment could be 16% to 17% above current annual levels. In 20 years they are projected to rise between 20 and 22 percent.

Output Revenue

Under Alternative B, the BLM-administered AUMS would support direct annual output revenue to the livestock sector of more than $27 million within 10 years (compared to a current level of $23.5 million). In 20 years it could reach approximately $28 million annually. Currently, direct output revenue to the two-county area's livestock sector from total area livestock output is about $70.5 million. This translates into almost $183 million in total livestock-supported area output revenues. Of this livestock-related revenue, BLM-administered AUMs currently support about one-third, or $61 million. Under Alternative B, this figure could rise to almost $71 million in 10 years and $73 million in 20 years.

Personal Income

Total joint county area personal income stemming from total area livestock activities is currently almost $22 million annually. About $7 million is supported by BLM-administered AUMs. Ten years under this alternative could raise the BLM portion to between $8 and $9 million annually, and it would remain at this level for the entire plan implementation period.

Employment

The two-county area's total livestock sector directly employed between 1,500 and 1,600 people in the 1985-86 base period. About one-third (516) of these were supported by BLM-administered livestock AUMs. Increases in available BLM-administered AUMs would raise BLM's support to approximately 601 positions in 10 years and to 618 by 20 years.

When indirect and induced employment related to livestock sector operations are considered, the two-county area total in 1985-86 was closest to 2,640 positions, with BLM-administered AUMs supporting about 879. In 10 years the BLM portion could increase to almost 1,030 positions, and in 20 years to almost 1,060.

Forestry

At 800 MBF, the output of sawlogs under Alternative B would be slightly higher than the 500 MBF produced under Alternative A. Therefore, the direct sales value of timber output from BLM-administered land would be expected to be from $3,000 to $6,000 higher annually under this alternative. This means the total joint county area output revenue would increase between $6,000 and $14,000 annually. This increase in timber sales would also produce approximately a $1,000 to $4,000 rise in total area personal income, but employment related to BLM-administered timber output would remain at not more than one fulltime worker equivalent.

Minerals

The effects on socioeconomic conditions from mineral related activities under Alternative B would be similar to those described for Alternative A.

Recreation

General Effects

Under Alternative B, BLM-administered lands would be expected to provide almost 379,070 RVDs. This would be equivalent to almost $8 million in direct area revenues annually. This is roughly 75% more RVDs and about 60% more annual direct revenues than projected under Alternative A.

Although an average of about one-fourth of the area's total RVDs would occur on BLM-administered lands under Alternative B, these lands would host larger percentages of some individual activities. For example, 100% of the area caving, more than 90% of pronghorn hunting, about 80% of sage grouse hunting, and 54% of area sightseeing would occur on BLM-administered lands.

Output Revenue

On BLM-administered land under this alternative, hunter and fisherman days, jointly, would rise about 50% above similar RVDs under Alternative A. The increase would be largely due to a two-thirds increase in fishing days. The BLM-administered lands under Alternative B would generate about two-fifths (more than $5 million) of the planning area's total direct annual revenues related to hunting and fishing.

Each nonconsumptive recreational activity on BLM-administered lands would be expected to realize a higher number of RVDs under this alternative than under Alternative A. This would result in 90% more in nonconsumptive RVDs than under Alternative A. Direct annual revenue generated by nonconsumptive RVDs on BLM-administered lands would approach $2.8 million, or about 16% of the two county area's total direct annual revenues from nonconsumptive RVDs.

Not all of the increases in recreation on BLM-administered land under this alternative would translate into increases in the two-county area's total RVDs and subsequent economic sector because a large part of the BLM increases result from a transfer of land and related RVDs from the BOR to the BLM. Therefore, the same number of RVDs would simply be moved from BOR to BLM administration. Under Alternative B, the area's total RVDs (close to 1.4 million) would generate direct annual area revenues of almost $32 million, $817,000 higher than under Alternative A. If indirect and induced revenues were included, this area total would approach $61.5 million annually, about $1.6 million higher than under Alternative A. The BLM-administered lands would support about 25% of the area's total annual recreation-related revenues under either Alternative A or B.

Personal Income

Under Alternative B, total joint county area personal income related to recreational activities would exceed $10.4 million, which would be more than $250,000 higher than under Alternative A. About 25% of the total would be supported by BLM-administered lands, compared to 16 to 17% under Alternative A.

Employment

The total annual joint county area employment supported by the area's recreation would reach roughly 790 positions under Alternative B, which is about 20 positions more than projected for Alternative A. The RVDs on BLM-administered lands would support about one-fourth of the total 790 positions.

Unavoidable Adverse Impacts

Prescribed burning would increase the smoke and dust in the air.

Oil and gas production would continue to decline as existing fields became depleted.

Annual accelerated soil loss would amount to 3.2 million tons in the short term and 2.06 million tons in the long term under this alternative. This loss is in addition to the natural soil loss of about 1.4 million tons.

Long-term loss of vegetative productivity on nearly 200 acres surrounding newly developed livestock watering facilities. This acreage would continue to be affected throughout the useful life of the projects that caused the loss, approximately 25 to 50 years.

Suspended sediment loads would increase by 12% in the short term.

Short-Term Uses versus Long-Term Productivity

Under Alternative B, short-term uses would be likely to cause the effects on long-term productivity that are described below.

Intensive grazing management systems and range improvement projects would increase forage productivity in the long term.

Modified spring forage use would improve range condition and vegetative diversity in some areas.

Proposed range projects would cause short-term soil losses that would be offset by increases in soil protection afforded by improved vegetation cover. Overall, surface rehabilitation and watershed manipulation measures would cause short-term impacts on soils; however, these impacts would be insignificant and more than offset by long-term benefits. For example, there would be an upward trend in range condition on 194,500 acres in about 20 years.

Wildlife habitat would decline within 10 years but improve beyond 10 years. The acreage on which decline would continue and where habitat would improve would continue in both the short term and the long term are displayed in table 34 in the wildlife habitat section.

Irreversible and Irretrievable Commitment of Resources

The annual accelerated erosion of about 3,248,500 tons of soil in the short term and 2,058,400 tons in the long term would cause a cumulative loss in upland soil productivity. About 10% of this soil would be lost as sediment to the streams that drain the planning area. Soil compaction would reduce effective moisture infiltration and soil productivity. The rehabilitation potential of upland sites would be reduced as result of this soil loss.

Net vegetative productivity would be reduced on more than 400 acres per year by mining activities.

Some surface-disturbing activities would cause long-term or permanent changes in the natural landscape. Most of this would be near landscapes that have already been altered.

ALTERNATIVE C

Introduction

Alternative C would address resource management conflicts by increasing the level of land use restrictions and by providing for more intensive management of noncommodity resources than would Alternative A or B. The general cause and effect relationships between management actions and environmental consequences described for Alternative A also would exist for Alternative C. The impacts described below reflect the differences between Alternative A and Alternative C.

Effects on Resources

Air Quality

More timber slash burning and prescribed burning would increase the smoke and dust in the air. However, only acceptable reductions in air quality would be expected under Alternative C.

Cultural Resources

The effects on cultural resources from management actions associated with fire management, forest management, livestock grazing, landownership adjustments, and termination of withdrawals would be the same under Alternative C as under Alternative B. The effects on cultural resources from surface-disturbing activities, including locatable mineral exploration and development, would be the same as those described for Alternative A.

The level of unintentional damage to cultural resources from ORV use would be reduced in all proposed ACECs under Alternative C through ORV closures or the restriction of ORV use to designated roads and trails. Locatable mineral closures in all or part of each proposed ACEC would provide other protection for cultural resources. In parts of the Chapman Bench proposed ACEC and in the Sheep Mountain Anticline proposed ACEC, the use of limited wildfire suppression techniques would reduce the possibility of unintentional damage to cultural resources.

Forestlands

The effects on forest resources and timber harvest under Alternative C would be the same as those described for Alternative A.

Geology and Minerals

More restrictions would be placed on surface-disturbing activities in the planning area under Alternative C than under the other alternatives. This would mean that fewer areas would be available for oil and gas exploration and development (see table 3 in chapter 2).

Termination of some BOR withdrawals and C&MU classifications, landownership adjustments, and restriction on surface disturbances near scenic rivers would have the same effects on minerals exploration and development under Alternative C as those described for Alternative B.

Restrictions on surface disturbances in essential habitat for bald eagles and black-footed ferrets and on lands above caves would have the same effects on minerals exploration and development under Alternative C as those described for Alternative A.

Prohibition of surface disturbance on slopes greater than 20% to protect fragile soils would mean that 130,000 more acres would be unavailable for drilling than at present. The additional restrictions generally would not preclude drilling but could increase the cost of obtaining access to some drilling locations.

Surface disturbances and land use in grouse habitat areas would be prohibited when total unreclaimed disturbances exceeded 10% of a habitat area unless the operator provided onsite or offsite mitigation and habitat improvement or development. This would not have a significant impact on oil and gas activities even in the Elk Basin field. As shown in map 50, two grouse habitat areas overlap the Elk Basin field on the east. It is estimated that surface currently is disturbed in more than 9% of the northern habitat area, which is shaded on the map, and that almost 7% of the surface of the southern habitat area is disturbed. With no reclamation activity, the 10% threshold limit would be reached when fewer than 20 wells have been drilled in the shaded area. This could occur within the next few years.

Approval of new activity on existing leases would be subject to additional mitigating measures and habitat development requirements. This would increase exploration and development costs.

Other fields with overlapping sage grouse habitat areas and their estimated percentage of disturbance are Frannie (6%), Pitchfork (almost 4%), and South Oregon Basin (3%). Fourteen other fields in the planning area have overlapping grouse habitat areas with less than 3% disturbance.

If a new field with new federal leases was discovered near a sage grouse lek, it is unlikely that total surface disturbance from oil and gas activity would reach 10%. This would be true even if the new field was entirely within the habitat area. This assumption is based on surface disturbance per well, spacing orders, projections of future development, and that the field would produce only from one horizon or formation. According to Wyoming state spacing order 302, only 12 wells could be drilled in a gas field. This would amount to less than 1% surface disturbance. If the new field was an oil field, 200 wells could be drilled, causing 7% to 9% disturbance.

No effect would be expected from limitations on snow removal in big game winter ranges during severe winters.

No surface use or disturbance would be allowed high, moderate, and low value ferret habitat areas. This restriction would apply only to the specific portions of the lease overlain by habitat areas. Most of these areas occupy less than 40 acres each. Some of these areas could be large enough to preclude directional drilling, which could result in insufficient or improper drainage of a reservoir. Directional drilling would increase exploration and development costs.

Bighorn River HMP/RAMP tracts would be closed to oil and gas leasing under Alternative C. If these areas were overlying a hydrocarbon reservoir, it could not be drained. Protection of the surface could be achieved without the potential for loss of royalties and taxes if a "no surface occupancy" restriction was applied. This would allow a reservoir to be produced without damage to the surface.

No oil and gas leasing would be allowed on the 160 acres in the Five Springs Falls ACEC. Protection of the surface could be achieved with a "no surface occupancy" restriction.

Bighorn River HMP/RAMP tracts would be withdrawn from mineral entry under the 1872 Mining Law. The withdrawal would have no effect on valid existing rights of the claimants; therefore, the impact on locatable mineral development would be low. Since there are already claims on most of the tracts, very little additional protection of other resources would be gained from a mineral withdrawal.

In Alternative C, the potential adverse effects on oil and gas exploration and development would be increased because of the closure of the proposed Carter Mountain ACEC to exploration and development. This closure would mean the loss of the opportunity to develop oil and gas resources, so that lease rentals and potential compensatory royalties also would be lost.

Overlapping seasonal restrictions to protect wildlife in the Chapman Bench proposed ACEC under this alternative would limit drilling time from a minimum of about four months to a maximum of about six months per year, depending on location. Oil in this area is most likely to occur in the Frontier Formation, which is about 15,000 feet below the surface. Drilling to reach this depth would take two or more years to complete because of the seasonal restrictions; the added cost of drilling could make exploration uneconomical. However, on the basis of projections of future activity, it appears unlikely that the area would be drilled for deep gas within the next 10 years. Shallower reservoirs could be developed within "open" periods allowed by seasonal limitations, and because of this, adverse effects on oil and gas development would not be expected in the Chapman Bench proposed ACEC.

The Five Springs Falls proposed ACEC also would be closed to oil and gas exploration and development, but adverse effects would not be expected because of the very low hydrocarbon occurrence potential in this area.

Lease rentals and compensatory royalties could be lost from Bighorn River tracts in the proposed Sheep Mountain ACEC because those tracts would be closed to oil and gas exploration and development. This probably would not be a significant impact because hydrocarbon occurrence potential is thought to be low in the immediate vicinity of Sheep Mountain, and any fields discovered probably would be small.

Although additional locatable mineral closures would be made in the Carter Mountain, Little Mountain, and Sheep Mountain Anticline proposed ACECs, no effects would be expected on locatable mineral exploration and development. In the two proposed ACECs that have large numbers of existing claims (Little Mountain and Sheep Mountain Anticline), most areas of mineralization are already covered by mining claims. A new mineral closure would not have any effect on the valid existing rights for mineral exploration and development that would be associated with these claims. Bentonite and gypsum claims would not be included in the area of mineral closure on Sheep Mountain, but building stone claims would be.

Livestock Grazing

Alternative C would have greater effects on livestock grazing than the other alternatives. Short-term adjustments would cause a reduction of 16,525 AUMs from existing use and a reduction of 29,524 AUMs from the maximum authorized level of grazing that could be allowed under Alternative A. The proposed reductions would affect 62 allotments with individual reductions ranging from 1% to 65% per allotment (see appendix G).

Livestock forage availability would increase by 19,139 AUMs in 10 to 20 years through natural regeneration and project implementation. This long-term level would be 10,385 AUMs below maximum authorized grazing use under present management and 2,614 AUMs above the present average 5-year licensed use.

Livestock grazing would be adjusted on 60 allotments and eliminated on 2 allotments to provide space and restore forage productivity for WGFD wildlife population objectives. These adjustments would affect the livestock industry significantly because livestock would have to absorb all the reductions needed to eliminate forage conflicts between wildlife and livestock.

Federal AUMs associated with permits and/or leases provide a monetary value to a ranch unit as a whole. These AUMs are used as security for loans and affect an operator's ability to qualify for and receive loans. Therefore, a reduction in authorized AUMs might result in significant financial impacts for some operators.

Priority would be given to range projects emphasizing enhancement of wildlife, watershed, and riparian values. These would include prescribed burning and use of interseeding and water developments that would improve livestock distribution, provide additional water sources and forage for wildlife, and stabilize or improve watershed and soil values (see the "Proposed Range Improvement Projects" section of appendix G).

Livestock grazing would be excluded from wetland/riparian habitat areas in "I" category allotments through fencing and off-site water developments. Most of these areas are located in 5 to 9 inch precipitation zones, where the need for livestock to use riparian areas is greatest. Off-site water developments do not satisfy many of the indirect livestock needs such as forage diversity and thermal protection. The restrictions against use of riparian areas would cause additional effects on livestock operators during critical seasons or in drought conditions.

Wild horse populations would increase to 135 horses in the McCullough Peaks herd area, and

the Foster Gulch unit would be reactivated with 45 horses. Reductions in livestock forage to allow for increased wild horse numbers would equal 1,875 AUMs in six allotments. This would be significant in relation to additional adjustments that would be made to provide for WGFD wildlife population objectives and for watershed protection and restoration.

Livestock trailing would be restricted to existing withdrawn livestock driveways to prevent conflicts with grazing use in adjacent allotments. This would result in significant impacts for five operators who depend on livestock trailing outside of livestock driveways. The affected operators would be required to truck livestock to higher ground or to permitted forestlands or to obtain permission from private landowners to move livestock.

No significant adverse effects on livestock grazing would be expected to result from landownership adjustments or from termination of BOR withdrawals.

Recreation

Recreational use would increase by 77,220 RVDs under Alternative C through the transfer of lands to BLM administration from BOR administration, through termination of BOR withdrawals, and through addition of more interpretive and directional signs. The changes in annual recreation use are displayed in table 36. Facilities would be constructed for the protection of areas where recreational use would be substantial. Lack of access to some river tracts and major restrictions on ORV use would lead to losses of some opportunities for hunting and motorized recreation.

Establishment of three additional SRMAs would help to enhance recreation opportunities by providing increased management emphasis in areas containing high recreation values. However, ORV restrictions within SRMAs would offset any gains in RVDs. Facilities provided in the SRMAs would help to protect natural resource values by making sites less susceptible to damage from substantial use.

Effects on recreation caused by peregrine falcon recovery areas would be the same as those described for Alternative A.

Restrictions on mineral exploration and development would prevent direct damage of important recreation resources. Specifically, a "no surface occupancy" restriction would protect areas around major caves and newly discovered cave passageways. Bighorn River tracts would be protected by mineral withdrawals and "no leasing" restrictions.

Restrictions on ORV use would reduce dispersed vehicle use by 66%. Seasonal road closures and limitation of use to designated roads or trails would account for most of this reduction. Road closures during big game hunting seasons would severely limit hunting opportunities on both the Absaroka and Bighorn mountain slopes and could cause enforcement problems. Designation of three play areas would provide opportunities for motorcycles and all-terrain vehicles around the major communities in the planning area.

Lack of access, ORV restrictions, and reduction in mineral development would increase the semiprimitive nonmotorized opportunities by 455% (see table 37).

Closure of the Carter Mountain proposed ACEC to ORV use under Alternative C would reduce recreation use to about 300 RVDs annually, or 80% below the level of Alternative A. The remaining use in the proposed ACEC would continue to be hunting and winter activities.

The effects on recreation in the Chapman Bench proposed ACEC under Alternative C generally would be the same as those described for Alternative A.

Recreation use in the Five Springs Falls proposed ACEC would not increase significantly over Alternative A. Additional interpretive signs, restrictions on climbing and hiking, and closure of the proposed ACEC to ORV use would not affect the recreation opportunities. The designation of the proposed ACEC for management according to Class I VRM objectives would protect the visual integrity of the natural landscape.

Recreation use in the Little Mountain proposed ACEC under Alternative C would be about the same as that described for Alternative B; for example, use would increase to about 1,500 RVDs annually because of the establishment of visitor services, construction of facilities, and use of directional and interpretive signing. Cave use would make up 60% of this increase in use, and hunting, fishing and sightseeing would account for the remainder. Limitation of ORV use to designated roads and trails under Alternative C would reduce adverse effects on caves while allowing access throughout the proposed ACEC.

Recreation use in the Sheep Mountain Anticline area would increase to approximately 2,800 RVDs per year under Alternative C because interpretive and directional signs would be placed in the area, and recreational facilities would be built along the Bighorn River.

TABLE 36

CHANGES IN ANNUAL RECREATION USE UNDER ALTERNATIVE C

Activity	West Slope Special Recreation Management Area		Bighorn River Special Recreation Management Area		Cave Special Recreation Management Area[1]		Historic Trails Special Recreation Management Area		Cody Extensive Recreation Management Area[2]		Total Recreation Use	
	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change
Water-based uses	0	0	700	+75	0	0	0	0	1,400	+75	2,100	+31
Fishing, hunting & trapping	40,000	-6	22,000	+5	0	0	0	0	40,000	+189	102,000	+26
Off-road vehicle use	650	-68	200	0	0	0	0	0	1,000	-50	1,850	-59
Cave use	10	-40	10	-75	2,000	+123	0	0	50	-50	2,070	+97
Sightseeing and other recreation	45,600	0	26,000	+4	0	0	1,000	0	113,250	+98	185,850	+45
Total Use	**82,260**	**-4**	**48,910**	**-4**	**2,000**	**+123**	**1,000**	**0**	**115,700**	**+108**	**293,870**	**+37**

Note: Columns headed "% Change" show percentage of change from Alternative A that would occur under Alternative C.

[1] Figures for Cave SRMA indicate only the underground use of caves. Recreation use taking place on the surface is included in West Slope SRMA or Cody Extensive Recreation Management Plan.

[2] Includes some BOR withdrawn lands.

TABLE 37

RECREATION OPPORTUNITIES UNDER ALTERNATIVE C AND CHANGE FROM ALTERNATIVE A

Type of Recreation	West Slope Special Recreation Management Area		Bighorn River Special Recreation Management Area		Cave Special Recreation Management Area		Cody Extensive Recreation Management Area		Totals	
	Acreage	% Change	Acreage	% Change	Acreage	% Change	Acreage	% Change	Acreage	% Change
Semiprimitive nonmotorized	1,220	0	0	0	0	0	228,000	+445	229,220	+455
Semiprimitive motorized	146,200	+1	21,500	+16	1,200	0	1,075,100	-11	1,243,800	-9
Roaded natural	6,000	-15	20,000	-13	0	0	377,580	-13	403,580	-12
Rural	12,080	0	500	0	0	0	393,820	0	406,400	0
Total	**165,300**	**0**	**42,000**	**0**	**1,200**	**0**	**2,074,500**	**0**	**2,283,000**	**0**

Note: Columns headed "% Change" show percentage of change from Alternative A that would occur under Alternative C.

The effects on recreational opportunities from landownership adjustments and from termination of some BOR withdrawals and C&MU classifications would be the same under Alternative C as those described for Alternative B.

Soils

Alternative C would lead to major reductions in accelerated soil erosion in both the short term and the long term (see table 38). These changes would result largely from changes in grazing management that would improve vegetation and reduce soil compaction. The short-term decrease would be almost 685,700 tons; the long-term decrease, nearly 775,000 tons. In addition, there would be a 73% reduction in recreation-caused soil impacts compared to those under Alternative A, and almost a 43% reduction relative to those in Alternative B. This improvement would be the result of additional closures and limitations for ORV use.

TABLE 38

ESTIMATED SOIL LOSS UNDER ALTERNATIVE C

Resource Use or Activity	Existing Total Soil Loss (Alternative A)	Total Soil Loss (tons per year) (Alternative C)	Percentage of Change	Soil Units Most Affected
Recreation uses	460,700	124,300	-73	B2, B4, B5
Range projects	1,600	500	-66	B2, B6
Grazing	1,925,000			
(short-term)		1,599,800	-17	B2, B3
(long-term)		1,510,500	-22	B2, B3
Minerals activities	224,700	202,100	-10	B2, B6
Forest management	700	700	0	M1
Lands and realty	24,600	24,600	0	B3, B6
Access management	7,200	7,200	0	B2
Fire management	800	800	-50	B2, B6
Cultural resources	5,500	2,500	0	B3, B2
Total accelerated erosion	**2,647,800**			
(short-term)		**1,962,100**	**-26**	**B2, B3, B6**
(long-term)		**1,872,800**	**-29**	**B2, B3, B6**
Estimated natural erosion	1,420,000	1,420,000	0	B2, B3, B6
Total erosion	**4,067,800**			
(short-term)		**3,382,100**	**-17**	**B2, B3, B6**
(long-term)		**3,292,800**	**-19**	**B2, B3, B6**

Minerals activities would produce about 10% fewer effects on soils under this alternative because of the imposition of a 20% slope limitation on surface-disturbing activities to protect fragile soils.

No significant adverse effects on soil resources would be expected to result from possible sale of public lands or from termination of some BOR withdrawals and C&MU classifications.

Soil loss in the Carter Mountain proposed ACEC would be reduced significantly under Alternative C because ORV restrictions and mineral closures would eliminate most surface-disturbing activities.

Soil loss would increase in the Chapman Bench proposed ACEC because of management actions to improve long-billed curlew and mountain plover habitat through reduction of vegetative height and density by livestock grazing.

In the Five Springs Falls, Little Mountain, and Sheep Mountain Anticline proposed ACECs, soil impacts would result from exploration and development of leasable and locatable minerals, livestock grazing, right-of-way construction, and ORV use. The levels of these impacts under Alternative C would be somewhat less than those of Alternative A because of restrictions on surface-disturbing activities, including ORV use.

Vegetation

With an increase in the number of wild horses, range condition in wild horse herd management areas would decline and the amount of forage available for livestock and wildlife would decline. A decrease in upland basal vegetative cover would cause erosion and sedimentation of wetlands to increase. Wild horses affect salt shrub, sagebrush, sagebrush/grass, grasslands, and riparian vegetative types.

After about 20 years, range management activities (primarily reductions in stocking rates) would produce range condition ratings of 35% poor, 15% fair, 28% good, and 5% excellent in the parts of the planning area that have been inventoried.

Range project implementation would remove vegetation on about 23,000 acres, which would rehabilitate to at least good condition after 20 years.

ORV use would be more restricted more in this alternative than under Alternative A or B. Therefore, effects on vegetation would be less under this alternative.

An upward trend in vegetation on 9,585 acres would be expected in ten years under this alternative through wildlife habitat improvement activities such as manipulation of vegetation to increase plant species diversity and installation of protective fencing to prevent overuse of forage in riparian areas.

Range projects involving vegetative manipulations such as seeding, burning, ripping, and contour furrowing would be expected to improve range condition on the treated areas from poor or fair to at least good condition after treatment.

Effects on vegetation under Alternative C from mineral activity, R&PP uses, desert land entries, and timber management would be the same as to those for Alternative A.

Effects on vegetation from landownership adjustments and termination of some BOR withdrawals and C&MU classifications would be the same under Alternative C as those described for Alternative B.

Effects on vegetation in all the proposed ACECs under Alternative C would be the same as those described for Alternative B.

Visual Resources

Except in the Chapman Bench and Sheep Mountain Anticline proposed ACECs, effects on visual resources from management actions under Alternative C would be the same as those described for Alternative A.

Restricted ORV use in the Chapman Bench proposed ACEC would maintain or improve visual quality in the proposed ACEC.

Visual quality in the Sheep Mountain proposed ACEC would improve somewhat under Alternative C because of ORV restrictions and management of the area in accordance with Class I VRM objectives. However, visual quality would decline locally as a result of locatable minerals mining and exploration activity on building stone claims in the proposed ACEC.

Water Resources

There could be a decline in produced water discharges under this alternative if surface protection measures precluded the development of new wells in some areas. The discharge of less produced water would cause a slight long-term improvement in the water quality of receiving perennial streams because salt concentrations and other pollutants such as oil and grease would be reduced. However, over time wetland and riparian habitats would receive less water, as would livestock and wildlife watering locations. The loss of wetland habitat would be most noticeable where produced water makes up a high percentage of the annual water yield.

Annual suspended sediment loads would decrease from the present rates by 72,490 tons (18%) in the short term and 81,750 tons (20%) in the long term. Table 39 illustrates sediment loads that would be generated by each drainage basin under this alternative. Fifty-four percent of the reduction would be attributable to the improvement in range condition that would result from changes in livestock management prescriptions on "I" category allotments, and 42% would be brought about by restrictions on ORV use. The remaining 4% would be due to the additional restrictions that would be imposed on surface-disturbing activities (timber harvesting, mineral exploration and development) to protect fragile soils, wildlife, and wildlife habitat.

TABLE 39

ESTIMATED SHORT-TERM AND LONG-TERM SEDIMENT LOADING UNDER ALTERNATIVE C

Drainage	Existing Sediment Loading (tons per year)	Short-term		Long-term	
		Sediment Loading (tons per year) Years 1 through 10	Percentage of Change	Sediment Loading (tons per year) More Than 10 Years	Percentage of Change
Bighorn River Subbasin					
Dry Creek	10,800	8,960	-17	8,770	-19
Shell Creek	7,400	5,690	-23	5,500	-26
Greybull River	15,800	14,760	- 7	14,760	- 7
Miscellaneous tributaries	60,000	47,240	-21	44,940	-25
Shoshone River	262,000[1]	215,450[2]	-18	208,890[3]	-20
Bighorn River Subbasin subtotal	356,000	292,100	-18	282,860	-21
Clarks Fork Subbasin					
Big Sand Coulee	10,000	7,750	-23	7,740	-23
Miscellaneous tributaries	44,900	38,560	-14	38,550	-14
Clarks Fork Subbasin subtotal	54,900	46,310	-16	46,290	-16
Planning area total	**410,900**	**338,410**	**-18**	**329,150**	**-20**

[1] Of this, 32,100 tons per year come from Whistle Creek.

[2] Of this, 26,060 tons per year come from Whistle Creek.

[3] Of this, 24,840 tons per year come from Whistle Creek.

No significant adverse effects on water resources or water quality would be expected to result from possible sale of public lands or from termination of some BOR withdrawals is C&MU classifications under Alternative C.

Wetlands

Under Alternative C, the condition of wetlands would improve rapidly as a result of livestock management actions that would limit utilization rates to 25% to 30%. Stream zones would develop more ground cover, and new year classes of cottonwoods and other woody vegetation would survive with the reduced rates of livestock grazing. In addition, the wetland habitat potential of reservoirs and springs could be more easily developed under the reduced rates of grazing use.

Wildlife habitat and watershed improvement projects would benefit wetlands. The net effect would be improvement of wetland habitat along about 20 miles of stream and around 120 reservoirs and 10 springs over a ten-year period. In addition, wetlands would benefit from limitations on access and restriction of ORV use to existing roads and trails.

There would be more impacts on wetlands in wild horse herd areas under Alternative C than under the other alternatives because two horse herds would be maintained and the total population of wild horses would be larger.

Overall, wetlands would improve faster under Alternative C than under Alternative A or B. The condition of wetland habitat would improve, and about 60% of the stream zone miles would improve by at least one condition class during the next ten years. Reservoir and spring habitat also would improve.

Wild Horses

Under Alternative C, livestock grazing would be reduced by 6,439 AUMs in six allotments to provide additional forage to support a total of 180 horses. During a period of 10 to 20 years, available forage for wildlife and wild horses would be increased by approximately 9,500 AUMs. Additional administrative workload and cost would result from the increased number of horses and the need to reintroduce horses in the Foster Gulch management unit.

Wild horses have destroyed range projects. Range condition would decline in portions of the herd area because of uneven grazing distribution of wild horses.

Wildlife and Fish Habitat

Fisheries

Under Alternative C, the condition of fisheries habitat would improve rapidly as a result of livestock grazing management actions that would limit utilization rates to 25% to 30%. Bank vegetation would respond immediately, and overhanging banks, narrower and deeper channels, and cleaner spawning gravels would begin to develop. With reduced grazing of uplands and changes in grazing systems, the amount of sediments reaching fisheries streams and reservoirs would decline.

The increased emphasis given to wetlands and fisheries projects and to soil stabilization and reservoir construction would accelerate improvement of fish habitat. Restrictions on surface-disturbing activities would reduce sedimentation of fisheries habitat, as would closure of the Bighorn River tracts to locatable mineral exploration and development. Because access to some streams and reservoirs would be limited, the potential for damage of fisheries habitat from recreation related activities would be reduced.

The downward trend in stream habitat condition could be reversed during the next ten years, and about 40% of the perennial stream miles would improve by at least one condition class. Reservoir fisheries could decline unless more silt retention reservoirs were built.

Generally, Alternative C would improve fish habitat much faster than either Alternative A or B.

Wildlife Habitat

Terrestrial Habitats and Animal Communities. Table 40 summarizes the effects on wildlife habitat that could be expected to occur under Alternative C.

Prescribed fire would be used during the next ten years to reduce excessive fuel loads beneath forest stands. This would reduce the potential for heat-intensive fire and loss of high-value forestlands on about 570 acres of public land.

Production and Recovery Habitat for Endangered Species. During the next ten years, approximately 2,500 acres of black-footed ferret recovery habitat would be surveyed for ferrets or improved for ferret recovery as described in the prairie dog ecosystem HMP (USDI, BLM 1986c).

TABLE 40
EFFECTS ON WILDLIFE HABITAT UNDER ALTERNATIVE C

Type of High Value Habitat	Continued Decline in Both Short Term and Long Term[1] (acreage)	Continued Decline in Short Term; Improvement in Long Term (acreage)	Improvement or No Change in Both Short Term and Long Term (acreage)
Forestlands		6,470	6,330
Endangered species production and recovery habitat			
Black-footed ferret			14,000
Bald eagle	170		690
American peregrine falcon			9,000
Candidate species production and recovery habitat			
Mountain plover		450	14,950
Long-billed curlew		450	14,950
Swainson's hawk			20,500
Swift fox		3,300	10,700
Waterfowl production habitat			
Sandhill crane staging habitat		900	
Raptor production habitat	520		165,000
Sage grouse production habitat	1,100		567,000
Wild ungulate support, sinter and parturition habitat			
Pronghorn	7,900	362,100	711,000
Elk	14,300	48,600	100,900
Mule deer	42,700	372,000	524,300
Moose	5,900	19,600	25,500
Bighorn sheep	6,600	20,400	64,100

Note: This table displays quantifiable impacts only. See the narrative for the complete impact analysis.

[1] Short term = within ten years; long term = more than ten years.

The habitat quality of 170 acres (1%) of bald eagle production habitat would be reduced by human intrusions and other activities associated with bentonite mining. Bald eagles probably would not be affected during the next 10 years, but bald eagle production could be lowered by mining activity in 10 to 25 years. All high potential bald eagle recovery habitat would be incorporated into the Yellowtail Wildlife Habitat Management Unit and managed for eagle production and winter support. This would be expected to result in the establishment of one new eagle nest within ten years and the improvement of 230 acres of winter support habitat.

Six nesting pairs of American peregrine falcons would be expected to occupy portions of the planning area in the next ten years. Peregrine falcon reintroductions would be carried out as in Alternatives A and B.

Production and Recovery Habitat for Candidate Species. The quality of production habitat for long-billed curlews and mountain plovers would be reduced in the next ten years by human intrusions and other disturbances from oil and gas activity. This would occur on about 450 acres (2%) of such habitat both inside and outside the Chapman Bench proposed ACEC. This would eliminate one nesting pair of one of those species. The ACEC proposal would include development and improvement of 6,000 acres of foraging and production habitat for curlews along Sand Coulee Draw. This would be expected to increase the breeding curlew population by 50%.

Alternative C would include additional resource protection measures for ferruginous hawk nest sites. Not more than four breeding pairs of ferruginous hawks would be expected to inhabit the planning area in ten years, but the potential for

species recovery would be better under this alternative than under Alternative A or B. Swainson's hawks would not be adversely affected by management actions under Alternative C.

Production and Staging Habitat for Waterfowl and Water Birds. The quality of 900 acres (2%) of sandhill crane fall staging/roosting habitat would be reduced in the next ten years by human intrusion and other disturbances due to oil and gas activities. This would cause a 1% reduction in the crane population.

With the avoidance of power line construction near major river drainages, power line collision mortalities of migrating and resident water birds still would occur, but the number would be expected to be lower than under Alternatives A and B.

The loss of invertebrate prey animals would be less under Alternative C than under Alternative A or B because of restrictions on chemical control of noxious weeds. This would improve the production of waterfowl, double-crested cormorants, and great blue herons.

Raptor Production Habitat. Human intrusions and disturbances from bentonite mining activities would reduce raptor production habitat by about 520 acres during the next ten years. This probably would cause one nest to be abandoned.

Collision mortalities of certain raptor species would be expected to be fewer under Alternative C because of construction of aboveground power lines would be avoided along major rivers. These are the areas where most wetland habitats, flight routes to feeding areas, and migration corridors are found.

Grouse Production Habitat. Human intrusion and other disturbances related to bentonite mining would cause abandonment one sage grouse strutting ground in the next ten years, and the quality of 1,100 acres of sage grouse habitat would be reduced.

Adverse effects on sage grouse and sharp-tailed grouse would be less likely under Alternative C than under Alternatives A and B because a provision would be added to prohibit the disturbance of more than 10% of suitable nesting habitat within 2 miles of strutting grounds.

Habitat for Big Game Ungulates. Competition for forage would occur between livestock and pronghorn on about 370,000 acres of the pronghorn habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 7,900 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect pronghorn populations in the Badger Basin, Carter Mountain, and Crystal Creek herd units. The affected public lands support 35% of the summer pronghorn population and 38% of the winter pronghorn population in those herd units. Within ten years, this could result in a net increase of 51% of the existing pronghorn population (see table 41).

TABLE 41

EXPECTED CHANGES IN POPULATIONS OF BIG GAME UNGULATES UNDER ALTERNATIVE C

Species	Current WGFD Population Objective Level	1984 Post-season Population Estimate	Estimated Population After 10 Years	Percentage of Change in Population[1]
Pronghorn	7,810	5,140	7,740	+ 51
Elk	12,200	12,680	11,600	- 10
Deer	32,600	27,680	32,300	+ 14
Moose	440	355	430	+ 19
Bighorn sheep	2,820	2,830	2,800	- 1

[1] Comparison between population estimate and estimated population after 10 years.

Competition for forage would occur between livestock and elk on about 62,000 acres of the elk habitat on public lands. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 14,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect elk populations in the Carter Mountain, Clarks Fork, Horse Creek, Northeast Bighorn, and North Fork Shoshone herd units. The affected public lands support 2% of the summer elk population and 6% of the winter elk population in those herd units. Included in the areas of conflict are 19,000 acres of the crucial winter habitat and parturition habitat for elk on public land.

Surface disturbance and other activities associated with mineral development would reduce elk crucial winter habitat by about 190 acres and would reduce elk parturition habitat by about 80 acres. The quality of 6,500 more acres of elk parturition habitat would be lowered.

Localized human disturbances from ORV traffic would displace elk populations on crucial winter ranges and calving ranges and probably would cause mortalities.

Cumulatively, the effects discussed above would result in a net loss of 10% of the existing elk population.

Competition for forage would occur between livestock and big game ungulates on about 420,000 acres of the pronghorn habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 42,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect deer populations in the Clarks Fork, Devils Canyon, Greybull River, Horse Creek, Meeteetse, Shoshone River, and South Fork Shoshone herd units. The affected public lands support 2% of the summer deer population and 6% of the winter deer population in those herd units. Included in the areas of conflict are 12,000 acres of crucial winter habitat for deer.

Surface disturbance and other activities associated with mineral development would reduce of crucial winter habitat for deer by about 700 acres, and the quality of 30,000 more acres would be lowered.

Cumulatively, the effects described above would result in a net increase of 14% of the existing deer population.

Competition for forage would occur between livestock and moose on about 26,000 acres of the moose habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 5,900 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect moose populations in the Greybull-Gooseberry and North Fork Shoshone herd units. The affected public lands support 10% of the summer moose population and 12% of the winter moose population in those herd units.

Competition for forage would occur between livestock and bighorn sheep on about 27,000 of the bighorn sheep habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 6,600 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect bighorn sheep populations in the Francs Peak, Trout Peak, and Wapiti Ridge herd units. The affected public lands support 2% of the summer and winter populations in those herd units. Included in the areas of conflict are 2,300 acres (13%) of the crucial winter habitat for bighorn sheep on public land. This would result in a net loss of 1% of the existing sheep population.

Effects on Socioeconomic Conditions

Agriculture

General Effects

During the first ten years of plan implementation under Alternative C, BLM-administered AUMs and subsequent revenues, personal income, and employment related to the joint county area livestock sector activities would decline by approximately 21% from existing levels. However, it is projected these items would rise 3% to 5% above the present levels in 20 years. If it is assumed that a change in BLM-administered

AUMs means a proportionate change in related livestock output, then related output revenue, personal income, and employment in the planning area would also change by the same percentages.

Output Revenue

The amount of annual direct area output revenue supported by BLM-administered AUMs would decline in the first 10 years under this alternative, from an existing $23.5 million to about $18.5 million. It would rise subsequently in 20 years to approximately $24.3 million. In annual area revenues attributable to BLM-administered AUMs utilized by the livestock sector, this alternative would produce $48 million (versus an existing $61 million) in 10 years and $63 million annually in 20 years.

Personal Income

Total annual personal income attributable to BLM-administered AUMs in the joint county area would drop from about $7.2 million to $5.7 million in 10 years. It would then increase to $7.5 million in 20 years.

Employment

In 10 years, Alternative C would lower direct employment by the livestock sector by more than 100 positions and total joint county area employment by about 187 positions. It is expected that in 20 years it would increase direct employment by 17 positions over current levels and total related area employment by 30 positions.

Forestry

Effects on socioeconomic conditions from forest management under Alternative C would be the same as those described for Alternative A.

Minerals

The effects on socioeconomic conditions from mineral-related activities under Alternative C would be similar to those described for Alternative A.

Recreation

General Effects

Under Alternative C, it is projected that between 35% and 40% more RVDs would occur on BLM-administered land than under Alternative A. Most of this increase would result from a possible transfer of 128,000 acres of BOR-withdrawn lands to BLM administration, with a subsequent transfer to the BLM of the related RVDs provided by these lands. Therefore, the total economic effects on the resource area under Alternative C would be about equivalent to impacts under Alternative A, since total RVDs in the area would be about equal to those under Alternative A.

Output Revenue

It is estimated that BLM-administered lands would provide about 296,570 RVDs valued at $6.3 million annually under Alternative C. This is around 80,000 more RVDs and slightly more than $1 million more output value than the estimated amount for Alternative A. Most of the increase would result from 25,110 more fishing days worth almost $1 million and 56,220 more nonconsumptive recreation days valued at about $326,000. The largest nonconsumptive increases would be in picnicking and sightseeing.

RVDs of hunting, four-wheel driving, and snowmobiling would decline under Alternative C. Of the major recreational revenue producers, fishing would contribute $2.8 million to direct annual joint county area revenues, hunting almost $1.7 million, sightseeing roughly $1 million, and picnicking about $300,000 yearly.

When indirect and induced revenues are considered, RVDs on BLM-administered land would result in about $12 million in total annual output revenue to the area. Total area revenues from all area recreation would be expected to equal about $60 million annually under Alternative C.

Personal Income

Direct annual personal income supported by total joint county area recreation under Alternative C would be more than $6.7 million, of which 20% would be supported by recreation on BLM-administered lands. When indirect and induced income are included, the area total would be more than $10 million annually, with the BLM portion at more than $2 million.

Employment

Direct annual employment by the recreation sector under this alternative would approach 528 jobs, with about 20% supported by recreation on BLM-administered lands. When indirect and induced employment needed to support the recreation sector are included, the annual area total would be about 770 jobs, with about 156 supported by recreational activities on BLM-administered lands.

Unavoidable Adverse Impacts

There would be financial impacts on some livestock operators if livestock trailing was restricted to existing livestock driveways.

Road closures during big game hunting seasons would severely limit hunting opportunities on both the Absaroka and Bighorn mountain slopes and could cause enforcement problems.

There would be an annual accelerated soil loss of 1,962,600 tons in the short term and 1,873,300 tons in the long term, in addition to the natural soil loss of about 1,420,000 tons.

Short-Term Uses versus Long-Term Productivity

The a decline in produced water discharges would cause a slight long-term improvement in water quality of receiving perennial streams. This would also lead to a long-term reduction of surface water supplies and reduction of riparian habitat that are dependent on produced water.

Changes in grazing management would cause a decrease in accelerated soil erosion by almost 972,000 tons in the short term and 1,061,000 tons in the long term. These changes also would decrease suspended sediment loads by 52,000 tons in the short term and 57,000 tons in the long term. The condition of vegetation would be raised at least one class on 7,660 acres, and the condition of wetlands and fisheries habitat would improve rapidly.

Restrictions on ORV use would reduce soil impacts from existing management by 83%. Soil impacts would be 43% less than under Alternative B. This includes an annual decrease in sediment loads by 38,000 tons in the short term and 41,000 tons in the long term. Minerals activities would produce about 10% fewer impacts on soils compared to Alternative A.

Surface reclamation and watershed manipulation activities would cause short-term soil losses on specific sites; however, the impacts would be insignificant and more than offset by long-term benefits.

Irreversible and Irretrievable Commitment of Resources

The annual accelerated erosion of about 1,962,600 tons of soil in the short term and 1,873,300 tons in the long term would cause a cumulative loss in upland soil productivity. About 10% of this soil would be lost as sediment to the streams that drain the planning area. Soil compaction would reduce effective moisture infiltration and soil productivity. Rehabilitation potential on upland sites would be reduced as a result of this soil loss.

ALTERNATIVE D

Introduction

Alternative D, the agency's preferred alternative, would place greater emphasis on protection of the natural environment than Alternative A or B and would prescribe fewer restrictions on land use than Alternative C. Alternative D is made up of the management prescriptions from Alternative A for access management, fish and wildlife habitat, and forestry; a combination of management actions from Alternatives A and B for recreation and wild horses; and management actions primarily from Alternatives A and C for minerals management. The management actions for lands and realty and livestock grazing under Alternative D were drawn from Alternatives A, B and C, but Alternative D also contains a few management actions for these programs that are not included in any of the other alternatives.

Effects on Resources

Air Quality

The effects on air quality under Alternative D would be the same as those described for Alternative A.

Cultural Resources

Effects on cultural resources from actions associated with wildfire suppression, landownership adjustments, and termination of withdrawals under Alternative D would be the same as those described for Alternative B. The effects on cultural resources from surface-disturbing activities, including locatable mineral exploration and development, would be the same as those described for Alternative A.

Under Alternative D, the level of unintentional damage to cultural resources from ORV use would be reduced in all proposed ACECs because of ORV closures or the restriction of ORV use to

designated roads and trails. Locatable mineral closures in all or part of each proposed ACEC would provide other protection for cultural resources.

The use of limited wildfire suppression techniques would reduce the possibility of unintentional damage to cultural resources in parts of the Chapman Bench proposed ACEC and in the Sheep Mountain Anticline proposed ACEC.

Forestlands

The effects on timber under Alternative D would be the same as those described for Alternative A.

Geology and Minerals

Effects on minerals exploration and development under Alternative D from restrictions on surface disturbances in bald eagle and black-footed ferret essential habitat areas and on lands above caves would be the same as those described for Alternative A.

Effects on minerals exploration and development under Alternative D from restrictions on surface disturbances near scenic river areas would be the same as those described for Alternative B, as would effects from landownership adjustments and termination of some BOR withdrawals and C&MU classifications.

The objective of minimizing surface disturbances in grouse habitat areas would have effects on oil and gas exploration and development similar to those described for Alternative C. The effect generally would be that in some cases the cost of exploration and development would be increased by the emphasis placed on development of on-site or off-site improvement of grouse habitat. Although these costs would increase locally, most activities could continue without the need to provide this type of mitigation.

No surface disturbance would be allowed on high value recovery habitat for black-footed ferrets outside the essential habitat area for those animals. This restriction would apply only to the specific portions of a mineral lease overlain by recovery habitat areas. The effects of this restriction would be similar to the effects described for Alternative C except that the restriction would apply to fewer acres. Generally, oil and gas exploration and development would be possible by directional drilling beneath habitat areas, most of which occupy less than 40 acres.

Outside the essential habitat area, surface-disturbing activities would be prohibited on moderate and low value black-footed ferret recovery habitat areas until black-footed ferret searches could be conducted. This could cause minor delays in exploration and development.

A "no surface occupancy" restriction would be applied to Bighorn River HMP/RAMP tracts. These tracts lie within areas with moderate or high hydrocarbon potential, but no impact on exploration or development would be expected in the next ten years.

Effects on oil and gas exploration under Alternative D would be the same as those described for Alternative A in the Carter Mountain, Five Springs Falls, Little Mountain, and Sheep Mountain Anticline proposed ACECs. Effects in the Chapman Bench proposed ACEC would be the same as those of Alternative C.

The effects on locatable mineral exploration and development under Alternative D would be the same in all the proposed ACECs as those described for Alternative C.

Livestock Grazing

Proposed range projects and intensive management systems in 49 "I" allotments eventually would improve overall range condition and restore 3,613 AUMS in the long term. This would reflect a level within 97% of the existing grazing use of Alternative A. The suggested practices would be spring deferment of grazing, rest-rotation grazing systems, vegetation manipulations, and structural projects to improve livestock distribution.

Spring livestock grazing would be subject to rest rotation systems or grazing deferment on seven allotments to restore overall vigor of desirable cool season grasses. These measures might cause operators to seek private pastures or to use supplemental feed during specific seasons. The need to move livestock and to maintain facilities could mean additional work for the operators involved.

Livestock trailing would be monitored in allotments along historical livestock trailing routes so that appropriate use levels could be determined. Livestock trailing would be adjusted if it was in conflict with other grazing use within affected allotments. After monitoring and consultation with permittees, withdrawals for livestock driveways no longer required for trailing would be revoked. In addition, the BLM would modify routes of historical use to mitigate impacts associated with livestock trailing.

Recreation

Recreational use in the planning area would increase by 154,220 RVDs under Alternative D

through designation of three SRMAs, improved access, and promotion of recreation opportunities. The changes in annual recreation use are displayed in table 42.

ORV designations provided by Alternative D would change the pattern of ORV use. Designation of ORV play areas and increased directional signing would increase use from 4,500 to 5,400 RVDs. Access would be restricted in 15% of the planning area where ORV use would be limited to designated roads and trails; however, routes could be designated to allow access to areas that are now open to motor vehicles. There would be ample challenges for most ORV enthusiasts in the remaining 85% of the planning area.

Closing of areas around shooting ranges to ORV use, while necessary to protect the public, would reduce the size of the Bentonite Hills ORV play area. In addition, because that area would not be closed to locatable mineral development, its use for ORV activities could be lost; however, other areas could be designated for this use.

Restrictions on exploration for and development of leasable and locatable minerals would maintain the quality of important recreational resources. Specifically, the "no surface occupancy" restriction would protect major cave passages and newly discovered passageways. River tracts, recreation sites, and significant caves also would be protected by mineral withdrawals and "no leasing" restrictions.

ORV restrictions and restrictions placed on mineral development would stabilize opportunities for semiprimitive nonmotorized recreation in 2% of the planning area, as in Alternative A (see table 43).

No significant adverse effects on recreation resources would be expected to result from possible sale of public lands under this alternative, provided easements could be maintained or established for public access across the disposed lands. No significant effects would result from termination of some BOR withdrawals and C&MU classifications.

Recreation impacts caused by restrictions for peregrine falcon recovery area, historic trails, and by access restrictions would be the same as those described for Alternative A.

Recreation use under Alternative D would be about 1,500 RVDs, the same as in Alternative A, in the Carter Mountain proposed ACEC.

Effects on recreation in the Chapman Bench proposed ACEC would be the same as those described for Alternative A.

Recreation use in the Five Springs Falls proposed ACEC would not increase significantly over the level of 800 RVDs per year described for Alternative A. Other effects on recreation would be similar to those described for Alternative C; for example, additional interpretive signs, restrictions on climbing and hiking, and closure of the proposed ACEC to ORV use would not affect the recreation opportunities.

Recreation use in the Little Mountain proposed ACEC would be about the same as that described for Alternative B; for example, use would increase to about 1,500 RVDs annually because of the establishment of visitor services, construction of facilities, and use of directional and interpretive signing. Cave use would make up 60% of this increase in use, and hunting, fishing and sightseeing would account for the remainder. Limitation of ORV use to designated roads and trails would reduce adverse effects on caves while allowing access throughout the proposed ACEC.

Recreation use in the Sheep Mountain Anticline proposed ACEC would increase to the level described for Alternative B (about 3,500 RVDs per year).

Soils

Alternative D would lead to reductions in accelerated soil erosion in both the short term and the long term (see table 44). A decrease of about 60,700 tons in the short term and 490,600 tons in the long term would result largely from changes in grazing and recreation management. Effects on soils from range management would increase in the short term by about 6%, but they would decrease by about 17% in the long term.

Limitations on ORV use and concentration of recreation in designated areas would bring about a 37% reduction in recreation-caused soil impacts. There would be about 10% fewer effects on soils from minerals activities under Alternative D because a 20% slope limitation would be imposed on surface-disturbing activities.

The effects on soils under Alternative D would be the same in all the proposed ACECs as those described for Alternative C.

Vegetation

Under Alternative D, effects on vegetation due to surface-disturbing activities such as minerals exploration and development, right-of-way construction, ORV use, and timber harvesting would be the same as those described for Alternative C.

TABLE 42

CHANGES IN ANNUAL RECREATION USE UNDER ALTERNATIVE D

Activity	West Slope Special Recreation Management Area		Bighorn River Special Recreation Management Area		Cave Special Recreation Management Area[1]		Historic Trails Special Recreation Management Area		Cody Extensive Recreation Management Area[2]		Total Recreation Use	
	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change	RVDs	% Change
Water-based uses	0	0	1,400	+75	0	0	0	0	4,200	+425	5,600	+80
Fishing, hunting & trapping	45,000	+6	25,500	+5	0	0	0	0	44,000	+208	114,500	+40
Off-road vehicle use	1,600	-15	600	0	0	0	0	0	3,200	+60	5,400	+20
Cave use	10	-40	10	-75	2,000	+123	0	0	50	-50	2,070	+97
Sightseeing and other recreation use	66,000	+450	32,500	+30	0	0	1,000	0	143,800	+150	243,300	+75
Total use	**112,610**	**+25**	**60,010**	**+19**	**2,000**	**+123**	**1,000**	**0**	**195,250**	**+165**	**370,870**	**+70**

[1] Includes only underground cave use, other recreation use taking place on the surface is included in West Slope Special Recreation Management Area or Cody Extensive Recreation Management Area.

[2] Includes some BOR withdrawn lands.

TABLE 43

RECREATION OPPORTUNITIES UNDER ALTERNATIVE D AND CHANGE FROM ALTERNATIVE A

Type of Recreation	West Slope Special Recreation Management Area		Bighorn River Special Recreation Management Area		Cave Special Recreation Management Area		Cody Extensive Recreation Management Area		Totals	
	Acreage	% Change	Acreage	% Change	Acreage	% Change	Acreage	% Change	Acreage	% Change
Semiprimitive Nonmotorized	1,220	0	0	0	0	0	49,980	-43	51,200	0
Semiprimitive Motorized	145,000	0	18,500	0	1,200	0	1,199,900	-3	1,364,600	0
Roaded Natural	7,000	0	23,000	0	0	0	430,800	+3	460,080	0
Rural	12,080	0	500	0	0	0	393,820	0	406,400	0
Total	**165,300**	**0**	**42,000**	**0**	**1,200**	**0**	**2,074,500**	**0**	**2,283,000**	**0**

TABLE 44
ESTIMATED SOIL LOSS UNDER ALTERNATIVE D

Resource Use or Activity	Existing Total Soil Loss (Alternative A)	Total Soil Loss (tons per year) (Alternative D)	Percentage of Change	Soil Units Most Affected
Recreation uses	460,700	291,600	-37	B2, B3, B6
Range projects	1,600	2,900	+84	B2, B6
Grazing	1,925,000			
(short-term)		2,032,500	+6	B2, B3, B6
(long-term)		1,602,600	-17	B2, B3, B6
Minerals activities	224,700	224,700	0	B2, B6
Forest management	700	700	0	M1
Lands and realty	24,600	24,600	0	B6, B3
Access management	7,200	7,200	0	B2, B3
Fire management	800	400	-50	B2, B6
Cultural resources	2,500	2,500	0	B3
Total accelerated erosion	**2,647,800**			
(short-term)		**2,587,100**	**-2**	**B2, B3, B6**
(long-term)		**2,157,200**	**-18**	**B2, B3, B6**
Estimated natural erosion	1,420,000	1,420,000	0	B2, B3, B6
Total erosion	**4,067,800**			
(short-term)		**4,007,100**	**-1**	**B2, B3, B6**
(long-term)		**3,577,200**	**-12**	**B2, B3, B6**

After about 20 years, range management activities (stocking rate reductions, use of grazing systems, and range project developments) would result in range condition ratings of 27% poor, 31% fair, 21% good, and 4% excellent.

Vegetative manipulations to increase plant species diversity and protective fencing would improve the condition of 9,600 acres within 10 years. Range project construction would cause a short-duration removal of or reduction in vegetation on 27,000 acres, but these projects would improve range condition on these lands to good or better after 20 years.

Effects on vegetation under Alternative D would be the same as those described for Alternative B in all the proposed ACECs.

Visual Resources

The effects on visual resources under Alternative D would be the same as those described for Alternative A. For example, there would be long-term or permanent impacts on about 20% of the area disturbed by mineral exploration and development, right-of-way construction, timber harvesting, livestock grazing, and ORV use.

The visual quality of the Carter Mountain proposed ACEC would be maintained or improved under Alternative D through restrictions placed on surface-disturbing activities and ORV use.

Restricted ORV use would maintain or improve the visual quality of the Chapman Bench proposed ACEC under this alternative.

Effects on visual quality in the Five Springs Falls and Little Mountain proposed ACECs would be the same as those described for Alternative A.

Visual quality in the Sheep Mountain Anticline proposed ACEC would be improved somewhat under Alternative D through management of the area in accordance with Class I VRM objectives and restrictions placed on ORV use. However, visual quality would decline locally as a result of locatable minerals mining and exploration activity on building stone claims in the proposed ACEC.

Water Resources

Under Alternative D, salt loadings would gradually decrease as oil and gas production declined. This would result in a gradual improvement in the

water quality of receiving perennial streams. If produced water made up most of the flow, there would be a loss of aquatic habitat commensurate with reductions in produced water discharges.

Annual suspended sediment loads would decrease from the present rates by 11,000 tons (3%) in the short term and 53,000 tons (13%) in the long term. Table 45 illustrates sediment loads that would be generated by each drainage basin under this alternative.

Changes in range management on "I" category allotments would bring about a short-term increase (10,100 tons, or 2%) and a long-term decrease (32,900 tons, or 8%) in annual sediment yields. Management actions for recreation would reduce annual sediment yields by 17,000 tons (4%) through restrictions on ORVs and the designation of ORV play areas.

Restrictions that would be imposed on surface-disturbing activities to protect fragile soils, wildlife, and wildlife habitat would reduce annual sediment yields from these activities by 2,200 tons (1%).

Wetlands

Implementation of proposed grazing practices and projects in wetland areas would ensure rapid restoration and improvement of wetland habitat conditions in the planning area.

Stream habitat conditions would be improved through reductions in livestock grazing or changes in seasons of use. Vegetative diversity and density within the riparian zones would increase, causing the channels to narrow and become more stable. Implementation of projects to improve stream zones would accelerate habitat recovery.

Reservoir wetlands would improve through implementation of the proposed grazing practices and reservoir habitat enhancement projects, and would increase with construction of new reservoirs. Similar management practices would have the same effect on wetlands associated with springs.

Reduction of surface disturbance caused by grazing, oil and gas development, and ORV use would reduce erosion and subsequent sedimentation in wetlands, improving stream and reservoir habitat condition and extending the life of reservoirs.

The net effect of implementation of Alternative D would be reversal of the downward trend in habitat condition. About 40% of the stream zone miles would improve by at least one condition class during the next ten years. The habitat condition of the identified management reservoirs and springs either would be maintained in acceptable condition or would be improved. Alternative D would improve wetlands faster and to a greater extent than Alternatives A and B but to a lesser extent than Alternative C.

Wild Horses

The effects on wild horses from Alternative D would be the same as those described for Alternative A. After reductions, a healthy breeding herd would be maintained.

Wildlife and Fish Habitat

Fisheries

Fisheries habitat improvement under Alternative D would parallel that for wetlands. Establishment of improved grazing practices and implementation of stream and reservoir habitat improvement projects would improve and create fisheries habitat. Stream fish would benefit primarily through natural habitat recovery associated with reduced livestock use of stream zones.

Streamside vegetation would increase, resulting in narrower and deeper channels with overhanging banks. As the channels narrowed, rubble/gravel bottoms would become cleaner and more conducive to spawning and fish food production. With implementation of improved grazing systems, erosion and peak runoff from uplands would be reduced, resulting in further improvement of conditions for support of stream fish.

Creation of new water development projects would create new reservoir fisheries and would help to attract livestock away from stream zones. Construction of new reservoirs would result in creation of additional fisheries habitat.

Reduction of stream channel and upland erosion would decrease turbidity and sedimentation of fisheries habitat in streams and reservoirs. Improved watershed conditions would reduce peak flows and increase more desirable flows during low water periods, improving fish habitat conditions in both perennial streams and reservoirs.

Overall, implementation of Alternative D would stop or reverse the downward trend of perennial stream habitat and improve about 20% of the stream miles by at least one condition class. The decline of existing reservoir fisheries habitat would be slowed or temporarily halted. Construction of at least two new reservoirs with fish support capability would increase the total standing water fish habitat. Stream fish habitat would be

TABLE 45

ESTIMATED SHORT-TERM AND LONG-TERM SEDIMENT LOADING UNDER ALTERNATIVE D

Drainage	Existing Sediment Loading (tons per year)	Short-term		Long-term	
		Sediment Loading (tons per year) Years 1 through 10	Percentage of Change	Sediment Loading (tons per year) More Than 10 Years	Percentage of Change
Bighorn River Subbasin					
Dry Creek	10,800	10,350	- 4	9,110	-16
Shell Creek	7,400	7,790	+ 5	6,050	-18
Greybull River	15,800	15,470	- 2	15,260	- 3
Miscellaneous tributaries	60,000	67,450	+12	52,640	-12
Shoshone River	262,000[1]	252,130[2]	- 4	228,040[3]	-13
Bighorn River Subbasin subtotal	356,000	353,190	- 1	311,100	-13
Clarks Fork of Yellowstone Subbasin					
Big Sand Coulee	10,000	8,040	-20	8,030	-20
Miscellaneous tributaries	44,900	38,930	-13	38,920	-13
Clarks Fork River Subbasin subtotal	54,900	46,970	-14	46,950	-14
Planning area total	**410,900**	**400,160**	**- 3**	**358,050**	**-13**

[1] Of this, 32,100 tons per year come from Whistle Creek.

[2] Of this, 30,940 tons per year come from Whistle Creek.

[3] Of this, 26,920 tons per year come from Whistle Creek.

improved more under Alternative D than under Alternative A or B but less than under Alternative C. Reservoir fish habitat would be improved more than under Alternative A or C, but about the same as Alternative B.

Wildlife Habitat

Terrestrial Habitats and Animal Communities. Table 46 summarizes the effects on wildlife habitat that could be expected to occur under Alternative D.

As under all the other alternatives, the revision and implementation of the Rattlesnake Mountain Forest/Habitat Management Plan would lead to better integration of forest management practices and wildlife management practices. Actions carried out under Alternative D would improve animal species diversity and the quality and diversity of habitat in 5,900 acres (46%) of high-value forestlands. This would benefit approximately 160 wild animal species, including accipiters, cavity-nesting owls, moose, and elk.

Production and Recovery Habitats. Alternative D would have the same effects as Alternative C on production and recovery habitats for endangered species and candidate species, production and staging habitat for waterfowl and water birds, and production habitats for raptors and grouse. There would be no effect on Swainson's hawks.

Habitat for Big Game Ungulates. Competition for forage would occur between livestock and pronghorn on about 437,000 acres of the prong-

TABLE 46

EFFECTS ON WILDLIFE HABITAT UNDER ALTERNATIVE D

Type of High Value Habitat	Continued Decline in Both Short Term and Long Term[1] (acreage)	Continued Decline in Short Term; Improvement in Long Term (acreage)	Improvement or No Change in Both Short Term and Long Term (acreage)
Forestlands		6,470	6,330
Endangered species production and recovery habitat			
Black-footed ferret			14,000
Bald eagle	170		690
American peregrine falcon			9,000
Candidate species production and Recovery habitat			
Mountain plover		450	14,950
Long-billed curlew		450	14,950
Swainson's hawk			20,500
Swift fox		3,300	10,700
Waterfowl production habitat	5		
Sandhill crane staging habitat		900	
Raptor production habitat	520		165,000
Sage grouse production habitat	1,100		567,000
Wild ungulate support, winter and parturition habitat			
Pronghorn	144,000	293,000	644,000
Elk	34,300	64,400	65,100
Mule deer	156,700	419,000	363,300
Moose	26,000		25,000
Bighorn sheep	26,800	19,200	45,100

Note: This table displays quantifiable impacts only. See the narrative for the complete impact analysis.

[1] Short term = within ten years; long term = more than ten years.

horn habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 144,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect pronghorn populations in the Badger Basin, Carter Mountain, and Crystal Creek herd units. The affected public lands support 42% of the summer pronghorn population and 45% of the winter pronghorn population in those herd units. Within ten years, this could result in a net loss of 2% of the existing pronghorn population (see table 47).

TABLE 47

EXPECTED CHANGES IN POPULATIONS OF BIG GAME UNGULATES UNDER ALTERNATIVE D

Species	Current WGFD Population Objective Level	1984 Post-season Population Estimate	Estimated Population After 10 Years	Percentage of Change in Population[1]
Pronghorn	7,810	5,140	5,040	- 2
Elk	12,200	12,680	12,000	- 7
Deer	32,600	27,680	27,400	- 1
Moose	440	355	355	0
Bighorn sheep	2,820	2,830	2,770	- 2

[1] Comparison between population estimate and estimated population after 10 years.

The impacts on elk from forage conflicts in Alternative D would be the same as those under Alternative A. The affected public lands support 2% of the summer elk population and 7% of the winter elk population in those herd units. Included in the areas of conflict are 35,000 acres of the crucial winter habitat and parturition habitat for elk on public land.

The effects on elk from forest management, ORV use, and mineral development would be the same under Alternative D as those described for Alternative C.

Cumulatively, the effects on elk from Alternative D would result in a net loss of 7% of the existing elk population.

Competition for forage would occur between livestock and big game ungulates on about 581,000 acres of mule deer and white-tailed deer habitat on public land. On these lands, the grazing use of some of the plant groups (grasses, forbs, shrubs) would exceed the amount of the vegetation that the plants could replace under normal climatic conditions. On approximately 156,000 of these acres, use would be extensive enough to remove from all of the plant groups more total vegetation than the amount that would normally be replaced. These conflicts would affect deer populations in the Clarks Fork, Devils Canyon, Greybull River, Horse Creek, Meeteetse, North Fork Shoshone, Shoshone River, and South Fork Shoshone herd units. The affected public lands support 3% of the summer deer population and 9% of the winter deer population in those herd units. Included in the areas of conflict are 39,000 acres of crucial winter habitat for deer.

The effects on deer from forest management and mineral development would be the same under Alternative D as those described for Alternative C.

Cumulatively, the effects on deer from Alternative D would result in a net loss of 1% of the existing deer population.

The impacts on moose from forage conflicts in Alternative D would be the same as those under Alternatives A and B.

Effects on moose from forest management under Alternative D would be the same as those described for Alternative C.

The impacts on bighorn sheep from forage conflicts in Alternative D would be the same as those under Alternatives A and B.

Effects on Socioeconomic Conditions

Agriculture

General Effects

Under Alternative D, the annual allowable forage levels and related output revenue, personal income, and employment would be lower than either current levels or levels projected for Alternative A. The number of AUMs projected for the first 10 years under Alternative D would be roughly 8% lower than those projected for Alternative A. However, in the long term, some of this loss would be regained, so that by the 20th year Alternative D allowable forage level would be only 2% to 3% less than the expected Alternative A level. For this analysis, it is assumed that changes in AUMs would be accompanied by equal changes in related output revenues, personal income, and employment.

Output Revenue

After 10 years under Alternative D, BLM-administered AUMs would support about $21.7 million of the two-county area's annual direct livestock sector revenue. This is approximately $1.8 million less than that projected for Alternative A. By the end of 20 years, BLM AUMs would support about $22.7 million in direct annual revenues, or approximately $800,000 less than would be expected under Alternative A. The total annual direct revenue realized by the area's livestock sector in the 1985-86 base period (from utilizing both public and private AUMs) was about $70.5 million.

The decline in direct output revenues under this alternative would lead to subsequent declines in indirect and induced revenues. This means the total output revenues (direct plus indirect plus induced) supported by BLM-administered livestock AUMs could amount to slightly more than $56 million by the 10th year and nearly $59 million by the 20th year. By comparison, BLM-administered AUMs currently support almost $61 million in total annual area revenues. Under Alternative A, the current levels would continue during the first 10 years of the plan but would decline to $60 million in 20 years. In 1985-86, the total area livestock sector supported about $183 million of total area output revenue.

Personal Income

The total livestock sector accounted for almost $22 million in direct plus indirect plus induced annual personal income in the two-county area in 1985-86. The BLM-administered AUMs supported about one-third of that total. Under Alternative D, the total annual personal income supported by BLM-administered AUMs would decline from both current levels and levels projected under Alternative A. By the 10th year, the total could be $576,000 lower, but by the 20th year it could recover to about $240,000 less.

Employment

About one-third of the two-county area's livestock-related employment is supported by BLM-administered AUMs. Workers supported by the area's livestock sector activities totaled approximately 2,640 in the 1985-86 base period. BLM-administered AUMs supported about 879 of these. Under Alternative D, the total employment supported by BLM-administered AUMs could decline from current levels by 69 positions in 10 years. By comparison, the total annual number of area positions supported by BLM-administered AUMs would not change during the first 10 years under Alternative A, but it would decrease by about 12 positions in 20 years. Under Alternative D, some improvement would occur by the 20th year, so that the total employed could be only 29 positions lower than Alternative A levels.

Forestry

Effects on socioeconomic conditions from forest management under Alternative D would be similar to those described for Alternative A.

Minerals

Effects on socioeconomic conditions from minerals management under Alternative D would be similar to those described for Alternative A.

Recreation

General Effects

The total number of RVDs projected for the joint county area under Alternative D would be almost 1.4 million per year. This is about 6% more than the total projected for Alternative A. This increase would result entirely from a higher incident of nonconsumptive activities. Consumptive RVDs would remain the same as projected under Alternative A.

Output Revenue

Annual direct output revenue from the total joint county area recreational activities under this alternative would approach $32 million. About one-fourth of this would be supported by recreational activities on BLM-administered lands. Approximately 55% of the $32 million would be produced by the resource area's nonconsumptive activities. BLM-administered lands would be expected to support about 15% ($2.7 million) of the two-county area's direct annual revenues from nonconsumptive activities and about one-third ($5 million) of the two-county area's direct annual revenues from consumptive recreation.

About 90% of all the area pronghorn hunting and 80% of the sage grouse hunting would occur on BLM-administered land under Alternative D. In the nonconsumptive activities, BLM-administered lands host 100 percent of the area caving, more than 50% of the sightseeing, and about one-third of the picnicking.

Under Alternative D, including indirect and induced revenues related to area support of the recreation sector, total annual revenues would exceed $61 million, with BLM-administered land supporting about $15 million of that total. Total revenues under Alternative D would be 2% to 3% higher than under Alternative A.

Personal Income

Under this alternative, recreation in the two-county area would support a total of almost $7 million in direct personal income annually and more than $10.4 million in total annual area income. BLM-administered lands would support about one-fourth of these totals. Total personal income would be about 2% to 3% higher than under Alternative A.

Employment

The total area employment related to recreational activities under Alternative D is projected at 790 jobs, about 20 jobs higher than would be expected under Alternative A. Recreation on BLM-administered lands would support about 192 of these positions. Approximately 68% to 70% of the total employment represents positions directly attached to the recreation sector rather than to support sectors.

Unavoidable Adverse Impacts

In addition to the natural annual soil loss of about 1,420,000 tons, the annual accelerated soil loss under Alternative D would be about 2,587,600 tons in the short term and 2,157,700 tons in the long term.

Short-Term Uses versus Long-Term Productivity

Intensive forest management under Alternative D would increase the productivity of timber stands by 80% to 100%.

Proposed range projects and intensive management systems eventually would improve overall range condition.

A cumulative loss in upland soil productivity and rehabilitation potential would be caused by annual accelerated erosion of about 2,587,600 tons of soil in the short term and 2,157,700 tons in the long term. About 10% of this soil would be lost as sediment to the streams that drain the planning area. Soil compaction would reduce soil productivity and moisture infiltration.

Annual sediment loads would increase by about 23,000 tons in the short term but decrease by about 83,000 tons from existing sediment loads in the long term. Changes in range management would increase sediment yields by 10,100 tons in the short term. However, in the long term sediment yields would decrease by 30,600 tons through changes in range management, by 16,000 tons through restrictions on recreation, and by 2,100 tons through restrictions on surface-disturbing activities for the protection of fragile soils and wildlife habitat.

Irreversible and Irretrievable Commitment of Resources

The losses in productivity from timber stands left as overmature growth would continue at approximately 200 MBF per year.

Short-term soil losses would be caused by proposed range projects; however, those losses would be offset by increases in soil protection afforded by improved vegetation cover.

Surface reclamation and watershed manipulation activities would cause short-term soil losses on specific sites; however, these impacts would be insignificant, and more than offset by long-term benefits.

On about 20% of the surfaces disturbed by various activities, the disturbance would be long term or permanent.

5 CONSULTATION AND COORDINATION

INTRODUCTION

The Cody RMP/EIS was prepared by an interdisciplinary team of BLM specialists from the Cody Resource Area, the Worland District, and the Wyoming State Office of the BLM. Reviews for accuracy and consistency were provided by both the district office and state office staffs.

Consultation, coordination, and public involvement have occurred throughout the process through public meetings, informal meetings, individual contacts, news releases, and *Federal Register* notices.

Initial steps in the process began in 1985 with the development of a preparation plan. Other early efforts included research, inventory, analysis, and interagency coordination.

PUBLIC PARTICIPATION

A public participation plan was prepared to ensure that the public would have numerous opportunities to be actively involved in the planning and environmental process. Both formal and informal input have been encouraged and used.

A notice published in the *Federal Register* in February 1986 indicated the intention of the BLM to prepare a resource management plan and requested information on coal and other specific resources. Letters requesting information on the potential for occurrence of minerals were mailed in February 1985 and October 1986.

A news release was issued in March 1987, and notices were mailed to solicit comments on a set of proposed planning criteria.

The Worland District Advisory Council has been kept apprised of the RMP progress, and comments and recommendations of the members have been solicited.

Each operator of a grazing allotment has been contacted either in person or in writing to discuss the categorization of his or her allotment.

Formal and informal meetings have been held with many members of the ranching and minerals industries and with other interest groups and agencies. A summary of comments generated from these meetings is on file in the Cody Resource Area office.

As part of the ongoing activity in consultation and coordination, the BLM is preparing a biological assessment of threatened and endangered species. Results of the assessment will be shared with the U.S. Fish and Wildlife Service as required by section 7 of the Endangered Species Act of 1973, as amended.

CONSISTENCY

Coordination with other agencies and consistency with other plans were accomplished through frequent communications and cooperative efforts between the BLM and involved federal, state, and local agencies and organizations.

The Wyoming Governor's Clearinghouse will be supplied with numerous copies of this draft document for review to ensure consistency with the state's ongoing plans. The RMP team has reviewed land use plans for Big Horn, Park, and Hot Springs counties to ensure consistency. BLM personnel have met with the respective county planners and commissioners to promote greater understanding of goals, objectives, and resources of both the counties and the BLM.

AGENCIES AND ORGANIZATIONS CONSULTED

Members of the RMP/EIS team have consulted formally or informally with numerous agencies, groups, and individuals during development of the plan. The following list is representative of the businesses, agencies, organizations, and individuals that have indicated an interest in the Cody RMP and those that have been contacted during the planning process. This list is not inclusive. A complete list is on file at the Cody Resource Area office.

Required Reviewers

United States Department of the Interior
- Office of Environmental Project Review, Denver, CO
- Bureau of Land Management, Washington, DC
- Bureau of Land Management, Cheyenne, WY
- National Park Service, Division of Environmental Compliance, Washington, DC
- U.S. Fish and Wildlife Service, Division of Environmental Coordination, Washington, DC
- Minerals Management Service, Offshore Environmental Assessment Division, Washington, DC
- Bureau of Reclamation, Division of Environmental Affairs, Washington, DC
- Bureau of Mines, Mineral Data Analysis, Washington, DC
- Geological Survey, National Center, Reston, VA

Department of Defense
- Department of the Air Force
  - Assistant Secretary of the Air Force, Install. Env. and Safety, Pentagon, Admiralty, VA
  - HQ USAF/LEER, Washington, DC
  - HQ SAC/DEPU, Offut AFB, NE
  - HQ-US LEVX, Office of Env. Planning, Bolling AFB, Washington, DC
- Department of the Army
  - Corps of Engineers, Omaha, NE and Portland, OR

Department of Energy, Washington
Nuclear Regulatory Commission, Bethesda, MD
Environmental Protection Agency, Denver, CO
Wyoming State Planning Coordinator, Cheyenne, WY

Other Reviewers

Federal Agencies

Department of Agriculture
- Soil Conservation Service
- Forest Service
- Farmers Home Administration

Department of Energy
- Western Area Power Administration

Department of the Interior
- Bureau of Indian Affairs
- Bureau of Reclamation
- National Park Service
- Fish & Wildlife Service
- Bureau of Land Management (other offices)

Department of Transportation
- Federal Highway Administration

Environmental Protection Agency

Federal Elected Officials

Office of Senator Alan K. Simpson
Office of Senator Malcolm Wallop
Office of Representative Dick Cheney

State Agencies, Commissions, and University

Office of the Governor of Wyoming
State of Wyoming
- Department of Environmental Quality
- Department of Agriculture
- Game & Fish Department
- Geological Survey
- Highway Department
- State Engineer
- Conservation Commission
- Recreation Commission
- Board of Land Commissioners
- Water Development Commission

University of Wyoming

State Legislators

State senators and state representatives from Big Horn, Ho Springs, Park, and Washakie counties

Counties and Cities

Mayors' offices of Basin, Burlington, Byron, Cody, Cowley, Deaver, Frannie, Greybull, Lovell, Meeteetse, and Powell

County Commissioners of Big Horn, Hot Springs, and Park counties

DISTRIBUTION

In addition to the agencies and offices listed above, notices, requests for comments, and copies of this document have been sent to businesses, organizations, interest groups, and individuals. Copies are available for review in the BLM offices in Cheyenne, Worland, and Cody and at the county libraries of Big Horn, Hot Springs, and Park counties.

Organizations, Businesses, and Individuals

The following list is not inclusive; rather, it is a representation of recipients of notices and copies

of this document. A complete list is on file at the Cody Resource Area office.

Organizations

Absaroka Flycaster Club
American Cave Conservation Association
American Wilderness Alliance
Audubon Society, High Plains Chapter
Audubon Society, Murie Chapter
Basin Sportsmens' Club
Big Horn Basin Wildlife Club
BLM Lands Foundation
Earth First!
Foundation for North American Wild Sheep
Girl Scout National Center West
Hot Springs County Sportsmens' Club
Izaak Walton League of America
Minerals Exploration Coalition
National Audubon Society
National Wildlife Federation
Natural Resources Defense Council
Park County Resource Council
Petroleum Association of Wyoming
Professional Outfitters & Guides of Wyoming
Public Lands Council
Rocky Mountain Oil & Gas Association
Wyoming Heritage Society
Wyoming Outdoor Council
Wyoming State Mineral & Gem Society
Wyoming Wool Growers Association

Businesses

5-Y Lumber Co.
91 Ranch
Altus Exploration Co.
Amerada-Hess
American Colloid Co.
American National Bank of Powell
Aminoil USA, Inc.
Amoco Production Co.
Antlers Ranch
Apache Corp.
Atlantic Richfield Co.
Armpit Grotto
Bass Enterprises Production
Bear Creek Ranch
Beard Oil Co.
Belnorth Petroleum Corp.
Bennette Creek Sheep and Cattle Co
Big Chief Exploration
Biota Research & Consulting
Black Bros.
Black Hawk Exploration
Bronco Oil & Gas Co.
Buckhorn Petroleum Co.
Carl Ballinger Estate
Cenex
Champlin Petroleum Co.
Chevron Exploration & Production
Chevron USA, Inc.
Cody Lumber Co.
Conoco, Inc.
Cork Petroleum Co.
Crescent Oil and Gas Corp.
Dale Weaver, Inc.
Dan Brown Trucking
Davis Oil Co.
EMC Energies Inc.
EMCOR Petroleum Inc.
Environmental Mgmt. Services Co.
Equity Oil Co.
Excel Energy Corp.
Exxon Co. USA
Frontier Archaeology
Fuel Exploration Inc.
Goldmark Engineering Inc.
Grabbert Ranch Co.
Grace Petroleum Co.
H&M Land Co.
Hrubetz Oil Co.
Hunt Oil Co.
Kiska Oil Co.
Marathon Pipeline Co.
McCullough Peaks Partners
Meridian Land & Mineral Co.
Mesa Petroleum Co.
Milestone Petroleum
Mobil Oil Corp.
Mooncrest Ranch
New Frontier Exploration
Noranda Exploration
Pacific Power & Light Co.
Pathfinder Energy Inc.
Phillips Petroleum
Pitchfork Ranch Co.
Ralph Wortham Construction
Rhodes Ranch
Shell Oil Co.
Striker Petroleum Corp.
Switchback Ranches
Tenneco
Texaco, Inc.
The Brinkerhoff Co.
The Pace Co.
The Valley Center/Valley Ranch
Tri-State Generation & Transmission Association, Inc.
Triangle X Ranch
Trigg Oil and Mining
True Oil Co.
Union Texas Petroleum
Viking Exploration
Winninger Ranch
YX Ranch

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APPENDIXES

APPENDIX A

THE RESOURCE MANAGEMENT PLAN PROCESS

INTRODUCTION

The RMP process consists of nine action steps, which are described below and illustrated in figure A-1.

STEPS IN THE PROCESS

Step 1: Identification of Issues

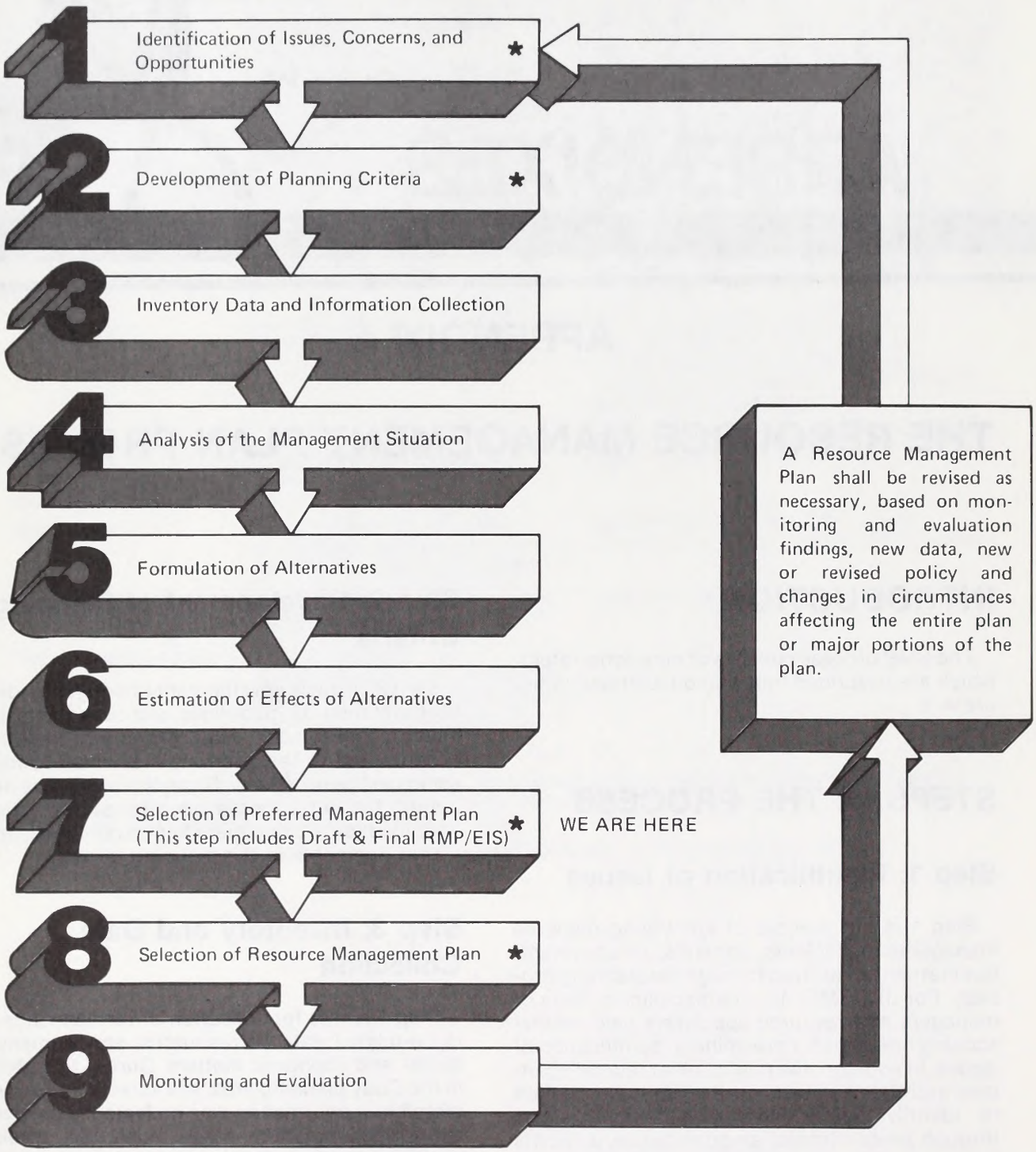
Step 1 is the process of identifying resource management problems, conflicts, or opportunities that can be resolved through the planning process. For this RMP, an interdisciplinary team of managers and resource specialists held several scoping meetings for preliminary identification of issues. In addition, the public, other federal agencies, and state and local governments were asked to identify public land management issues through news releases, an open house, a *Federal Register* notice, mass mailings, and public meetings. All identified concerns were assessed, and those that can be addressed in the planning process were consolidated into planning issues.

Step 2: Development of Planning Criteria

Step 2 involves development of criteria to identify the standards, guidelines, and constraints that would apply to each issue throughout the planning process. Criteria were made available to interested parties for review. Since the original review period, the criteria have been revised to reflect additional public comment and to remain current with refinements in the planning issues.

Step 3: Inventory and Data Collection

Step 3 allows for collection of various kinds of issue-related data on resources, environmental, social, and economic matters. During this phase in the Cody planning area, soil surveys were completed and information was collected on mineral occurrence potential, range condition, wildlife habitat, and other resources and resource conditions.


1 Identification of Issues, Concerns, and Opportunities *
2 Development of Planning Criteria *
3 Inventory Data and Information Collection
4 Analysis of the Management Situation
5 Formulation of Alternatives
6 Estimation of Effects of Alternatives
7 Selection of Preferred Management Plan (This step includes Draft & Final RMP/EIS) *
WE ARE HERE
8 Selection of Resource Management Plan *
9 Monitoring and Evaluation
A Resource Management Plan shall be revised as necessary, based on monitoring and evaluation findings, new data, new or revised policy and changes in circumstances affecting the entire plan or major portions of the plan.
* Public Participation Opportunities

PLANNING PROCESS

Step 4: Analysis of the Management Situation

In step 4, the current management situation is analyzed, public demand is assessed, and the capability of the resources to respond to the issues is evaluated. This analysis is the basis for formulating alternatives for the draft resource management plan. For this planning area, members of an interdisciplinary team prepared an analysis of the management situation for each resource program. These analyses are available for review at the Cody Resource Area and Worland District offices.

Step 5: Formulation of Alternatives

Options identified in step 4 provide the basis for alternatives formulated in step 5. In this RMP, four alternatives (described in chapter 2) were formulated by an interdisciplinary team. These alternatives are multiple-use oriented, and each represents a separate and complete resource management plan. Because the alternatives are multiple-use oriented, no one alternative is totally committed to resource use and development, nor is there one alternative that is totally oriented toward nondevelopment or resource protection.

Step 6: Analysis of Effects of Alternatives

In step 6, the physical, biological, social, and economic effects of implementing each alternative are assessed. This step is the environmental impact analysis required by NEPA. The analysis is presented in Chapter 4.

Step 7: Selection of the Preferred RMP

Step 7 involves selection of the preferred resource management plan and publication of a draft RMP/EIS. The draft RMP/EIS is made available for public review and comment for 90 days. The comment period for this document will begin when the Environmental Protection Agency's notice of filing of the draft RMP/EIS is published in the *Federal Register*.

Selection of the preferred management plan for the Cody RMP/EIS was based on public input and coordination, current BLM management policies and directions, and analysis of the impacts of each alternative.

Step 8: Selection of the Proposed Resource Management Plan

In step 8, a proposed resource management plan is selected on the basis of results of public review and comment. The proposed plan is then published in a document also containing a final EIS. After publication, a 30-day period is allowed during which any person who participated in the planning process and could be adversely affected by the plan may protest. Only issues that were submitted for the record during the planning process may be raised in such a protest. No earlier than 30 days after publication of the proposed RMP/final EIS, the selected resource management plan will be approved by the Wyoming State Director, BLM.

Step 9: Monitoring and Evaluation

Step 9 involves monitoring of the selected plan after it is implemented and evaluation of the results of implementation. Data on long-term trends and resource conditions will be collected and analyzed to determine effectiveness of the plan. Monitoring of the plan's effectiveness will continue indefinitely from the time the plan is implemented and may result in revisions of the plan, or portions of the plan, as changing conditions dictate.

APPENDIX B

WYOMING BLM STANDARD MITIGATION GUIDELINES FOR SURFACE-DISTURBING ACTIVITIES

[***NOTE:*** *This narrative was written by the Wyoming State Office, BLM, for uniformity in guidance for BLM offices throughout the State.*]

INTRODUCTION

About two years ago, BLM developed the "Wyoming BLM Standard Oil and Gas Lease Stipulations." During implementation, it was recognized that various land uses, other than those related to oil and gas exploration and development, should be subject to similar kinds of environmental protection requirements. Using the standard oil and gas lease stipulations as a basis, development of the "Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities" began.

These guidelines are primarily for the purpose of attaining statewide consistency in how requirements are determined for avoiding and mitigating environmental impacts and resource and land use conflicts. This does not mean that the consistency would be in terms of identical requirements for all similar types of land use activities that may cause similar types of impacts or that the requirements for a single land use activity would be identical in all areas where it may occur.

There are two ways the standard mitigation guidelines are used in the RMP/EIS process: (1) as part of the planning criteria in developing the RMP alternatives, and (2) in the analytical processes of both developing the alternatives and analyzing the impacts of the alternatives. In the first case, an assumption is made that any one or more of the standard mitigations will be appropriately included as conditions of relevant actions being proposed or considered in each alternative. In the second case, the standard mitigations are used (1) to develop a baseline for measuring and comparing impacts among the alternatives; (2) for identifying other actions and alternatives that should be considered, and (3) to help determine whether more stringent or less stringent mitigations should be considered.

The RMP does not decide or dictate the exact wording or inclusion of these guidelines. Rather, the standard guidelines are used in the RMP/EIS process as a tool to help develop the RMP alternatives and to provide a baseline for comparative impact analysis in arriving at RMP decisions. These guidelines will be used in the same manner in analyzing activity plans and other site specific proposals. These guidelines and their wording are matters of policy. As such, specific wording is subject to change primarily through administrative review, not through the RMP/EIS process. Any further changes that may be made in the continuing refinement of these guidelines and any development of program specific standard stipulations, will be handled in another forum, including appropriate public involvement and input.

PURPOSE

The purposes of the "Standard Mitigation Guidelines" are to (1) reserve, for the BLM, the right to modify the operations of all surface disturbing activities as part of the statutory requirements for environmental protection, and (2) inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands. These guidelines have been written to provide a standard format that will allow for (1) their direct use as stipulations, and (2) the addition of specific or specialized mitigation following the submission of a detailed plan of development, or other project proposal, and an environmental analysis.

Those resource activities or programs currently without a standardized set of permit or operation stipulations can use the mitigation guidelines as conditions of approval or as a baseline for developing specific stipulations for a given activity or program.

Because use of the mitigation guidelines will be integrated into the RMP/EIS process and the site specific environmental analysis process, the application of stipulations derived through the guide-

lines will provide more consistency with planning decisions and plan implementation than has occurred in the past. Application of the standard mitigation guidelines to all surface and other human presence disturbance activities on BLM-administered public lands will provide more uniformity in mitigation than has occurred in the past.

THE GUIDELINES

1: Surface Disturbance Mitigation Guideline

Surface disturbance will be restricted in any of the following areas or conditions. Modifications to this limitation may be approved in writing by the Authorized Officer.

a. Slopes in excess of 25 percent.

b. Within important scenic areas identified in a land use plan (Class I and II Visual Resource Management Areas).

c. Within 500 feet of surface water and/or riparian areas.

d. Within either one-quarter mile or the visual horizon (whichever is closer) of historic trails.

e. Construction with frozen material or during periods when the soil material is saturated, frozen, or when watershed damage is likely to occur.

Guidance

The intent of the **Surface Disturbance Mitigation Guideline** is to inform interested parties (potential lessees, permittees, or operators) that when one or more of the five (1a. through 1e.) conditions exists, surface disturbing activities will be restricted or prohibited, unless or until the permittee or his designated representative and the surface management agency (SMA) arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development.

Specific criteria (e.g., 500 feet from water) have been established based upon the best information available. However, such items as geographical areas and seasons must be delineated at the field level.

Waiver or modification of requirements developed from this guideline must be based upon environmental analysis of proposals, such as, plans of development, plans of operation, Applications for Permit to Drill, etc., and, if necessary, must allow for other mitigation to be applied on a site specific basis.

2: Wildlife Mitigation Guideline

a. To protect important big game winter habitat, activities or surface use will not be allowed during the period from November 15 to April 30 within certain areas encompassed by the authorization. The same criteria applies to defined big game birthing areas from the period of May 1 to June 30.

   This limitation may or may not apply to extended long-term operation and maintenance of a developed project, pending environmental analysis of any operational or production aspects.

   Modifications to this limitation in any year may be approved in writing by the Authorized Officer.

b. To protect important raptor and/or sage and sharp-tailed grouse nesting habitat, activities or surface use will not be allowed during the period from February 1 to July 31 within certain areas encompassed by the authorization. The same criteria applies to defined raptor and game bird winter concentration areas from the period of November 15 to April 30. This limitation may or may not apply to extended long-term operation and maintenance of a developed project, pending environmental analysis of any operational or production aspects.

   Modification to this limitation in any year may be approved in writing by the Authorized Officer.

c. No activities or surface use will be allowed on that portion of the authorization area identified within (*legal description*) for the purpose of protecting (e.g., sage/sharp-tailed grouse breeding grounds, and/or other species/activities) habitat.

   Modifications to this limitation in any year may be approved in writing by the Authorized Officer.

d. Portions of the authorized use area legally described as (*legal description*), are known or suspected to be essential habitat for (*Name*) which is a threatened/endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM and Fish and Wildlife Service (FWS) guidelines to verify the presence or absence of this species. In the event that (*Name*) occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., seasonal use restrictions, occupancy limitations, facility design modifications, etc.).

Guidance

The **Wildlife Mitigation Guideline** is intended to provide two basic types of protection, seasonal restriction (a and b) and prohibition of activities or surface use (c). Item (d) of course, is specific to situations involving threatened and endangered species. Legal descriptions will ultimately be required and should be measurable and legally definable. There are no minimum subdivision requirements at this time. The area delineated can and should be defined as necessary, based upon current biological data, prior to the time of processing an application and issuing the use authorization. The legal description must eventually become a condition for approval of the permit, plan of development, and/or other use authorization.

The seasonal restriction section identifies three example groups of species and delineates three similar time frame restrictions. The big game species including elk, moose, deer, antelope, and bighorn sheep all require protection of crucial winter range between November 15 and April 30. Elk and bighorn sheep also require protection from disturbance during the period of May 1 to June 30, when they typically occupy distinct calving and lambing areas. Raptors include eagles; accipiters; falcons (peregrine, prairie, and merlin); bitteos (ferruginous and swainson's hawks); osprey; and burrowing owls. The raptors and sage and sharp-tailed grouse all require nesting protection during periods between February 1 and July 31. The same birds often require protection from disturb-

ance during the period of November 15 through April 30 while they occupy winter concentration areas.

Item 2c, regarding the prohibition of activity or surface use is intended for protection of unique wildlife habitat areas or values within the use area. These areas or values must be factors that limit life-cycle activities (e.g., sage grouse strutting grounds, known threatened and endangered species habitat, etc.) that cannot be protected using seasonal restrictions.

Waiver or modification of requirements developed from this guideline must be based upon environmental analysis of proposals such as, plans of development, plans of operation, Applications for Permit to Drill, etc., and, if necessary, must allow for other mitigation to be applied on a site specific basis.

3: Cultural Resource Mitigation Guideline

When a proposed discretionary land use has potential for affecting the characteristics which qualify a cultural property for the National Register of Historic Places, mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 CFR 800 will be used in consultation with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required.

Guidance

The preferred strategy for treating potential adverse effects on cultural properties is "avoidance." If avoidance involves project relocation, the new project area may also require cultural resource inventory. If avoidance is imprudent or unfeasible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative measures.

Reports documenting results of cultural resource inventory, evaluation, and the establishment of mitigation alternatives (if necessary) shall be written according to standards contained in BLM Manuals, the cultural resource permit stipulations and in other policy issued by the BLM. These reports must provide sufficient information for Section 106 consultation. Reports shall be reviewed for adequacy by the appropriate BLM archaeologist. If cultural properties on, or eligible for, the National Register are located within these areas of potential impact and cannot be avoided, the Authorized Officer shall begin the Section 106 consultation process in accordance with the procedures contained in 36 CFR 800.

Mitigation measures shall be implemented according to the mitigation plan approved by the BLM Authorized Officer. Such plans are usually prepared by the land use applicant's contract archaeologist according to BLM specifications. Mitigation plans will be reviewed as part of Section 106 consultation for National Register eligible or listed properties. The extent and nature of recommended mitigation shall be commensurate with the significance of the cultural resource involved and the anticipated extent of damage. Reasonable costs for mitigation will be borne by the land use applicant. Mitigation must be cost effective and realistic. It must consider project requirements and limitations, input from concerned parties, and be BLM approved or BLM formulated.

Mitigation of paleontological and natural history sites will be treated on a case-by-case basis. Factors such as site significance, economics, safety, and project urgency must be taken into account when making a decision to mitigate. Authority to protect (through mitigation) such values is provided for in FLPMA, Section 102(8). When avoidance is not possible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative protection measures.

4: Special Resource Mitigation Guideline

To protect (*resource value*), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date-to-date) in (*legal subdivision*).

This limitation may or may not apply to extended long-term operation and maintenance of a developed project, pending environmental analysis of any operational or production aspects.

Modifications to this limitation in any year may be approved in writing by the Authorized Officer.

Example Resource Categories (Select or identify category and specific resource value):

a. Recreation areas.

b. Special natural history or paleontological features.

c. Special management areas.

d. Sections of major rivers.

e. Prior existing rights-of-way.

f. Occupied dwellings.

g. Other (specify).

Guidance

The **Special Resource Mitigation Guideline** is intended for use only in site-specific situations where one of the first three general mitigation guidelines will not adequately address the concern. The resource value, location, and specific restriction must be clearly identified. A detailed plan addressing specific mitigation and special restrictions on development will be required prior to development and will become a condition for approval of the permit, plan of development, or other use authorization.

Waiver or modification of requirements developed from this guideline must be based upon environmental analysis of proposals such as, plans of development, plans of operation, Applications for Permit to Drill, etc., and, if necessary, must allow for other mitigation to be applied on a site specific basis.

5: No Surface Occupancy Guideline

No surface occupancy will be allowed on the following described lands (*legal subdivision/area*) because of (*resource value*).

Example Resource Categories (Select or identify category and specific resource values):

a. Recreation areas, (e.g., campgrounds, historic trails, national monuments).

b. Major reservoirs/dams.

c. Special management areas (e.g., ACEC, known threatened and endangered species habitat, wild and scenic rivers).

d. Other (specify).

Guidance

The **No Surface Occupancy (NSO) Mitigation Guideline** is intended for use only when other mitigation is determined insufficient to adequately protect the public interest and is the only alternative to "no development" or "no leasing." The legal subdivision and resource value of concern must be identified and be tied to an NSO land use planning decision.

Waiver of or exception(s) to the NSO requirement will be subject to the same test used to initially justify its imposition. If, upon evaluation of a site-specific proposal, it is found that less restrictive mitigation would adequately protect the public interest or value of concern, then a waiver or exception to the NSO requirement is possible. The record must show that because conditions or uses have changed, less restrictive requirements will protect the public interest. An environmental analysis must be conducted and documented (EA or EIS, as necessary) in order to provide the basis for a waiver or exception to an NSO planning decision. If the waiver or exception is found to be consistent with the intent of the planning decision, they may be granted. If found inconsistent with the intent of the planning decision, a plan amendment would be required before the waiver or exception could be granted.

When considering the "no development" or "no leasing" option, a rigorous test must be met and fully documented in the record. This test must be based upon stringent standards described in the land use planning document. Since rejection of all development rights is more severe than the most restrictive mitigation requirement, the record must show that consideration was given to development subject to reasonable mitigation, including No Surface Occupancy. The record must also show that other mitigation was determined to be insufficient to adequately protect the public interest. A "no development" or "no leasing" decision should not be made solely because it appears that conventional methods of development would be unfeasible, especially where an NSO restriction may be acceptable to a potential permittee. In such cases, the potential permittee should have the opportunity to decide whether or not to go ahead with the proposal (or accept the use authorization), recognizing that an NSO restriction is involved.

APPENDIX C

GENERAL GUIDANCE, POLICY, AND REGULATIONS

INTRODUCTION

The practices described in this appendix are standard operating procedures in the Cody Resource Area that will be carried out regardless of the alternative selected. Many of the actions are taken to comply with applicable laws, executive orders, regulations, or other legal mandates.

CULTURAL RESOURCE MANAGEMENT

Class III cultural resource inventories will be conducted in advance of all surface altering activities where there is reason to believe that cultural resources can be found that are eligible for listing on the National Register of Historic Places. Salvage or stabilization required for other sites discovered by routine Class III cultural inventories, will be accomplished in a manner that will minimize effects on other resource values.

FIRE MANAGEMENT

Fire rehabilitation actions will be applied to areas burned by wildfire. Actions may include access management, seeding, water control, and use restrictions such as restriction of livestock grazing use.

Prescribed burning will be conducted in a manner that avoids violation of the Wyoming ambient air quality standards. Prescribed fire can be used to achieve management objectives on areas covered by habitat management plans and allotment management plans or in forested areas after logging has been completed.

FORESTLANDS MANAGEMENT

Harvest of forest products or planting and seeding in wetland/riparian habitat areas will be done only to improve the condition of forest, watershed, or wildlife habitat. This will apply to ephemeral drainages as well. Buffer zones will be maintained and other mitigations will be used to reduce damage to stream habitat. The use of culverts, elimination of skidding across streams and drainages, road closures, and planting or seeding will be used to protect stream habitats and water quality.

Prescribed burning will be used if needed to accomplish management objectives identified in the forest management plan, including disposal of slash piles and reduction of fuel loading.

Watershed damage by timber harvest will be mitigated by contract stipulations that require the purchaser to minimize erosion and soil damage and to comply with applicable state and federal laws pertaining to water quality.

LANDS AND REALTY MANAGEMENT

Landownership Adjustments

Land disposals involve transfer of title from BLM to nonfederal agencies (such as local or state government) or to individuals. These can be accomplished through methods such as desert land entry, public sale, exchange, and R&PP patents. Private lands may be acquired through purchase or exchange to meet specific resourcemanagement needs. Before disposal or acquisition

is carried out, site-specific environmental analyses will be required.

Withdrawals

The BLM administers lands withdrawn for special purposes by various federal agencies, such as power sites and some Bureau of Reclamation lands. The BLM also administers lands withdrawn under its own jurisdiction, such as stock driveways or public water reserves (as defined in the 1982 Interlocutory Decree for Wyoming Water Division III). When applications for land use involve withdrawn lands, restrictions based on BLM standard mitigation guidelines or other agency restrictions will be incorporated in the use authorization.

Under provisions of the FLPMA, all withdrawals will be reviewed near their expiration date for a determination of continued need. Withdrawals for which continuation is not justified will be terminated. For withdrawals that existed before the passage of FLPMA and do not have an expiration date, completion of review by October of 1991 is mandated by provisions of the act.

LIVESTOCK GRAZING MANAGEMENT

Restoration or improvement of wetlands associated with streams, reservoirs, springs, wells, and water distribution systems will be addressed in proposed grazing systems and range projects. Grazing treatments and range projects will be implemented to improve and restore wetlands.

MINERALS MANAGEMENT

Oil and Gas

All public lands in the planning area that are not formally closed to leasing will be leased with restrictions developed from the standard mitigation guidelines for surface-disturbing activities. To protect wetlands, watershed values, wildlife, and other resources or resource values, restrictions based on standard mitigation guidelines also will be applied to APDs and sundry notices. These restrictions must not be inconsistent with the original intent of the leases.

Discharges of oil and hazardous materials will be reported to appropriate agencies according to conditions of Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases, Reporting of Undesirable Events (NTL-3A). To protect human health, welfare, and the environment, the materials will be removed or secured, or the problem will be otherwise remedied in accordance with regulations of the BLM, the Environmental Protection Agency (EPA), and the state of Wyoming.

Contingency plans for the release of hydrogen sulfide gas ("sour gas") will be required for all drilling proposals that would penetrate a known or suspected hydrogen sulfide-bearing formation. These plans must provide for detection of hydrogen sulfide, countermeasures to control release of the gas, control of access to the drill site, notification of law enforcement agencies, and evacuation of the public.

Locatable Minerals

All public lands that are not closed to mineral entry will be open for exploration, development, and patent of locatable minerals. Areas closed to locatable mineral entry vary among the alternatives. Lands may be withdrawn from locatable mineral entry to protect other resource values. Activity on valid claims predating these withdrawals will not be affected by the withdrawals.

Discretionary management of locatable minerals is limited. To prevent unnecessary and undue degradation of public lands and to provide for reasonable reclamation, the BLM will apply regulations listed in 43 CFR 3809 and agreements made with the state of Wyoming pursuant to those regulations.

RECREATION MANAGEMENT

Recreation opportunities will be managed to ensure the continued availability of outdoor recreation opportunities the public seeks and that are not readily available from other public or private entities. Recreation management also will include protecting resources, meeting legal requirements for visitor health and safety, and mitigating resource user conflicts involving recreation.

Recreation management areas (special and/or extensive) will be designated to focus manage-

ment on areas with high recreation values or areas where there are conflicts between recreation and other uses. Recreational use of the Bighorn River for fishing, hunting, and float boating will be managed under the existing Bighorn River HMP/RAMP. Cave management will continue under the Worland Cave Management Plan.

Recreation site development projects and access will be managed to maintain or improve wetland habitat conditions along intensively used streams and reservoirs.

WATERSHED MANAGEMENT

Produced water discharges from oil and gas operations will be regulated by the permit process of the National Pollutant Discharge Elimination System (NPDES) and regulations of the Notice to Lessees and Operators of Federal and Indian Oil and Gas Leases, Disposal of Produced Water (NTL-2B).

The water quality of drinking water at the Five Springs Falls Campground will be maintained to comply with standards set by the Safe Drinking Water Act.

Oil and gas exploration wells and geophysical drill holes that produce water may be acquired by BLM, developed, and used for livestock, fish and wildlife, wetland habitat development or recreation purposes when they meet the district's water well conversion criteria. Wetland/riparian areas will be improved through implementation of reservoir maintenance and other projects that promote growth of shoreline vegetation or reduce erosion.

Existing federal reserved water rights will be protected. Nonreserved and temporary water use rights will be appropriated through the state of Wyoming.

WILDLIFE AND FISH HABITAT MANAGEMENT

Wetlands will be managed to maintain and improve their condition according to BLM policy and final internal procedures as provided for in the BLM's Riparian Management Policy of January 22, 1987, and prescribed in the *Federal Register* of March 15, 1979 (44 FR 15784) and February 5, 1980 (45 FR 7889) to implement Executive Orders 11988, Floodplain Management, and 11990, Protection of Wetlands.

The BLM will continue to cooperate with the WGFD in managing aquatic habitat that supports reproducing and stocked populations of fish in streams and reservoirs on public lands.

The objectives of management of habitat for threatened and endangered species will be to provide essential habitat for species inhabiting the planning area and to promote the recovery of threatened and endangered species to levels defined in national or regional recovery plans.

The management of fish habitat is included in the West Slope and the Bighorn River HMPs. Most projects will be implemented to restore or improve fish habitat. In addition, fish habitat will be managed through projects or grazing treatments to increase shoreline and upland vegetation.

APPENDIX D

CULTURAL RESOURCE MANAGEMENT

STEPS IN CULTURAL EVALUATION

Step 1

The BLM may require a cultural survey of a proposed project area. The survey is conducted by either BLM personnel or an outside contractor. A survey report is produced and copies provided to BLM and the State Historic Preservation Officer (SHPO). The BLM uses the report as a basis for evaluation of sites for eligibility for the National Register of Historic Places. The BLM also uses the report to determine the effect of the project on any significant resources and to determine the need to mitigate any impacts to significant resources (see figure D-1).

Step 2

The BLM specialist or cultural resource contractor plans the survey project, conducts background research of the project area, and reviews regional overviews and other documents for pertinent previous research and for terrain and field conditions in the project area. Before beginning fieldwork, the contractor conducts a site file search at the SHPO records office and, if necessary, at the local BLM office.

Step 2A

If the file search reveals that the project area has been adequately surveyed, or if the project area is one of demonstrably low site potential, a resurvey may not be warranted. The responsibility for determining the need for a survey rests with the BLM in consultation with the SHPO.

Step 2B

The results of the file search are documented in a report that should contain a complete bibliographic reference of the previous surveys and summary of previous sites located.

Step 3

The BLM or the contractor conducts the field survey of the project area. If standard inventory requirements do not apply, the overall field methodology, including survey intensity and aerial limits, are determined by the BLM in consultation with the SHPO.

Step 3A

If no sites are discovered during the survey, and if no previously recorded sites are located in the survey area, the negative results of the survey are documented in a Class III report. Cultural resource clearance is obtained and the project proceeds, subject to other resource considerations, as applicable.

Step 3B

If sites are discovered during the survey, or if previously recorded sites are located in the survey area, steps 4 through 9 are followed.

Step 4

Each site located is recorded on an Inter-Mountain Antiquities Computer System (IMACS) site form.

Step 5

Each new site and each previously recorded site is evaluated for National Register eligibility. Limited testing should be conducted as necessary.

Steps 6 & 6A

If a site is not eligible for the National Register, usually no further work is required (such as testing, monitoring, excavation, or avoidance). If the site contains information significant enough to warrant further work, the site should be evaluated

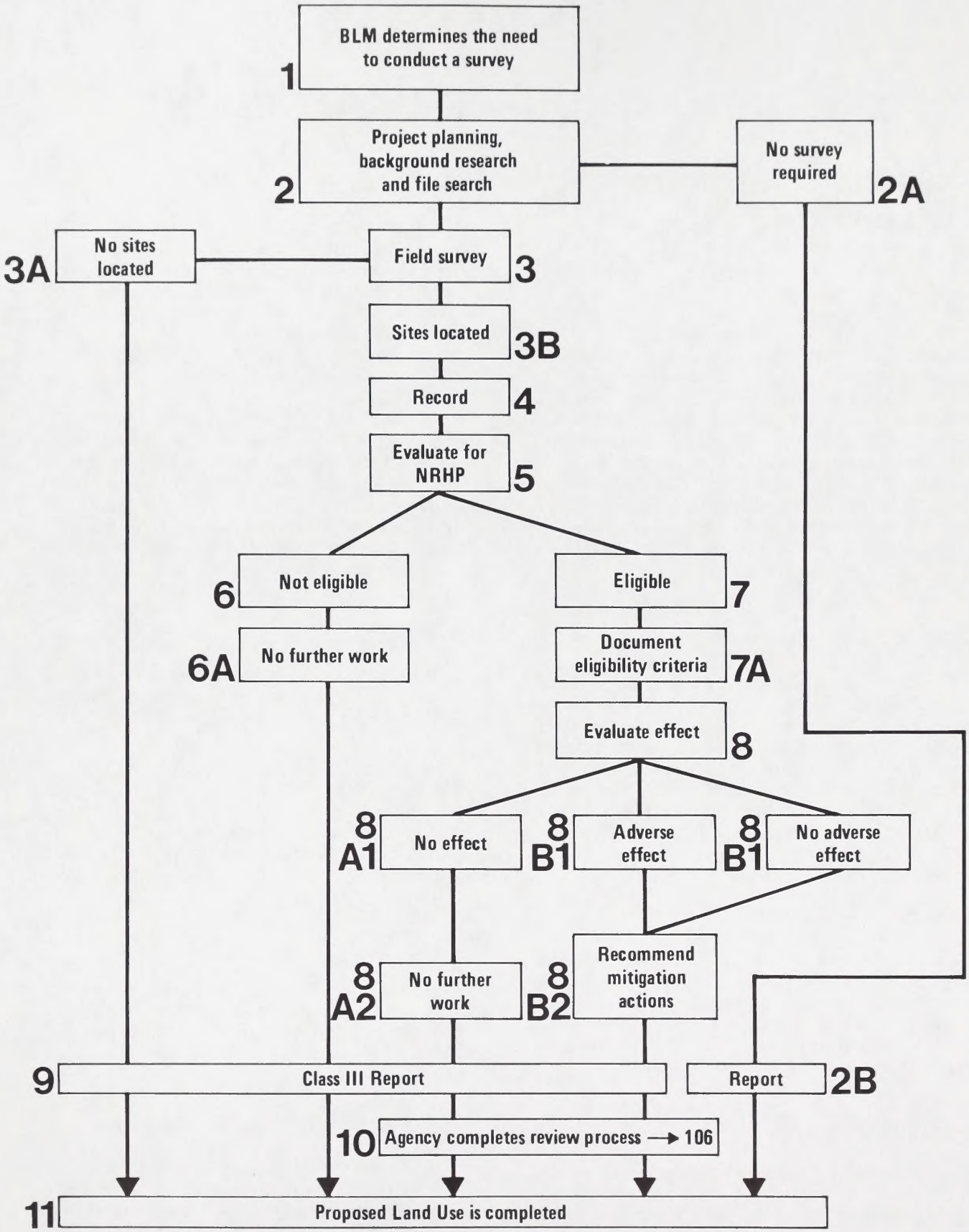


Figure D—1
CULTURAL RESOURCES PROCESS

as eligible (see step 7). The evaluation of noneligibility is documented and a recommendation of "no further work" is made in the report.

Steps 7 & 7A

If a site is evaluated as eligible for the National Register, the reasons for its eligibility must be documented, with a detailed description of how the site meets the criteria of eligibility (36 CFR 60.6). If a site is eligible because of its research potential or information content (36 CFR 60.6(d)) the report must document and discuss the site information content in terms of pertinent research questions that may be addressed.

Step 8

The effect of the project on each eligible site is evaluated and documented. "Effect" is determined by applying the criteria in 36 CFR 800.3.

Step 8A

If there will be no effect, or if the effect will not be adverse, no further work at the site is warranted. This is documented in the Class III report (see step 9).

Step 8B1

If the effects on the site will be adverse, this is also documented in the Class III report (see step 9).

Step 8B2

Recommendations to mitigate adverse effects should be directed at reducing or eliminating effects on the qualities that make the site eligible for the National Register. Avoidance or in situ preservation are the preferred options. Data recovery is appropriate if avoidance or in situ preservation are not feasible or cost-effective. Monitoring of construction also may be used under certain conditions.

Step 9

A report is prepared documenting the results of steps 1 through 8A2 and/or 8B2, and copies of the report are submitted to the BLM, the SHPO, and the applicant/land user.

Step 10

The BLM, in consultation with the SHPO and the Advisory Council on Historic Preservation, will use the information provided in step 9 to carry the "106" review process to completion.

Step 11

After the above process is completed, the proposed land use is permitted with appropriate resource stipulations.

APPENDIX E

POSSIBLE LANDOWNERSHIP ADJUSTMENTS

INTRODUCTION

Possible transfer of lands by disposal or acquisition will be considered individually. Acquisition of lands by the BLM usually will be accomplished by exchange. Disposal may be accomplished by exchange, public sale, R&PP patent, or desert land entry.

REVIEW PROCESS

No landownership adjustments will be implemented without a feasibility study, site-specific environmental analyses, and a determination that the transfer is in the public interest. Lands in certain categories will not be considered for disposal.

LAND DISPOSAL CRITERIA

Lands Not To Be Disposed of

The following lands will not be disposed of:

Lands withdrawn from operation of the public land laws or segregated pending withdrawal

Lands in wilderness study areas

Lands with mining claims of record under section 314 of FLPMA will not be disposed of unless BLM policy is changed in the future to allow for their disposal.

Lands Not Eligible for Desert Land Entry

Lands with the following characteristics will not be disposed of by desert land entry:

Lands that are mineral in character

Lands segregated from desert land entry by withdrawal and/or Secretarial Order

Lands where the water source has been fully appropriated

Lands where less than one-eighth of any particular parcel can be irrigated

Timbered lands

Other Factors to Be Considered

The following conditions will be evaluated during the review process for proposed land disposals or acquisitions. The degree to which any of these conditions apply to a proposed landownership adjustment may or may not make the lands suitable for disposal or acquisition.

Mineral values

Location of the lands in relation to ACECs, protective withdrawals, or other areas of special management emphasis, including VRM Class II areas and areas with opportunities for semiprimitive nonmotorized recreation

The importance of the lands for wildlife resources, as in the following examples,

Use by federally listed endangered, threatened, candidate, or emphasis species

Use by state-listed rare or uncommon species or species in need of special management or by state-protected mammals

Use by wildlife species of high federal or state interest

Tracts identified as potential recovery habitat for federally listed endangered, threatened, candidate, or emphasis species

Tracts with high value wildlife habitats such as wetlands, mountain shrublands, or Douglas-fir, Engelmann spruce-subalpine fir, or aspen-conifer forestlands

Whether the lands are in approved management plan areas; for example, those covered by an AMP or HMP

Whether the lands contain cultural resource sites suitable for National Register listing

Whether the lands contain karst areas

LANDS POSSIBLY SUITABLE FOR DISPOSAL

The lands identified below by tract may be suitable for disposal under section 203 or 206 of

FLPMA. These lands potentially meet criteria 1 and/or 3 of section 203 because they are difficult and uneconomical to manage or because they have the potential to meet important public objectives (such as community expansion or economic development) after disposal.

[An asterisk (*) indicates that the lands described are now segregated against disposal (7,155.16 acres). Before these lands could be disposed of, the withdrawal or classification would need to be removed.]

Sixth Principal Meridian

T. 46 N., R. 102 W.,
sec. 3, lot 5 (15.61);
sec. 4, E½SE¼;
sec. 9, E½NE¼;
sec. 10, lot 4 (38.47);
sec. 11, lot 2 (2.12);
sec. 21, lot 7 (40.00).

T. 47 N., R. 101 W.,
sec. 6, lot 5 (37.64);
sec. 17, SE¼NW¼.

T. 47 N., R. 103 W.,
sec. 8, lots 1 (7.46), 2 (7.33), 3 (7.20), 4 (13.98);
* sec. 9, lots 1 (47.31), 2 (46.88), 3 (46.45), 4 (46.02);
sec. 10, lots 1 (45.64), 4 (4.93);
sec. 11, lots 1 (5.06), 2 (5.15), 3 (5.24), 4 (5.32);
sec. 12, lots 2 (5.70), 3 (6.42).

T. 48 N., R. 100 W.,
sec. 6, lots 7 (44.65), 9 (24.33), 10 (26.48), SE¼SW¼, SW¼SE¼;
sec. 7, lot 3 (44.42), NE¼SW¼, NW¼SE¼.

T. 48 N., R. 101 W.,
sec. 1, lot 4 (41.19), 7 (25.49);
sec. 2, lots 1 (40.98), 5 (26.46);
sec. 3, E½SE¼;
sec. 9, N½SW¼, S½SE¼;
sec. 10, NE¼NE¼;
sec. 11, SW¼NE¼, NW¼, N½SW¼, NW¼SE¼;
sec. 12, N½SE¼;
sec. 15, NW¼;
sec. 31, lot 4 (38.26).

T. 48 N., R. 102 W.,
sec. 1, NW¼SE¼;
sec. 6, lot 11 (17.98);
sec. 9, SW¼NE¼.

T. 48 N., R. 103 W.,
sec. 19, lots 2 (34.64), 3 (34.46), NE¼SW¼;
sec. 21, NW¼NE¼, N½NW¼;
sec. 31, lot 2 (33.95), SW¼NE¼, SE¼NW¼, W½SE¼.

T. 48½ N., R. 103 W.,
sec. 31, lots 3 (18.48), 4 (21.88).

T. 48 N., R. 104 W.,
sec. 10, lots 1 (24.43), 2 (30.40), 3 (30.32), 4 (30.24);
sec. 27, lots 2 (7.46), 3 (34.76), 5 (36.38), NE¼NW¼, S½NW¼, N½SW¼, SW¼SW¼;
sec. 34, lots 3 (38.78), 4 (39.59).

T. 49 N., R. 100 W.,
sec. 31, lots 1 (16.15), 2 (38.78);
sec. 32, lots 1 (40.46), 2 (40.31).

T. 49 N., R. 101 W.,
sec. 6, lot 9 (14.64);
sec. 7, lots 1 (25.39), 2 (18.83);
sec. 8, lots 9 (34.56), 11 (20.62);
sec. 13, lot 3 (24.96);

T. 49 N., R. 101 W., (continued)
sec. 14, lot 7 (52.09);
sec. 17, lots 1 (19.52), 6 (15.29), 7 (52.28), 8 (57.54);
sec. 19, NE¼NE¼;
* sec. 20, lots 1 (19.43), 2 (37.63), NW¼NW¼;
sec. 22, lots 1 (5.73), 2 (8.96);
sec. 23, lot 5 (24.89), N½NW¼, SW¼NW¼;
sec. 27, lot 1 (48.92), tract 42C (40.00), D (40,00), E (40,00), F (40.00);
sec. 34, lot 1 (36.63);
sec. 36, lots 1 (20.05), 2 (44.86), 4 (43.07).

T. 49 N., R. 102 W.,
sec. 1, lot 5 (42.85);
sec. 5, lots 11 (28.12), 14 (26.22), 15 (25.75);
sec. 9, lots 9 (22.00), 10 (16.71);
sec. 10, lot 2 (51.04);
sec. 11, lots 2 (26.24), 3 (24.30);
sec. 22, lots 3 (29.12), 7 (13.53).

T. 49 N., R. 103 W.,
sec. 3, SW¼SE¼;
sec. 5, lots 6 (15.08), 7 (5.34);
sec. 8, NE¼NE¼;
sec. 35, lots 4 (28.24), 5 (28.24), SW¼.

T. 50 N., R. 99 W.,
sec. 17, lot 8 (23.88), NE¼SW¼;
sec. 21, lots 6 (17.09), 7 (28.37), 11 (28.67), 14 (7.15);
sec. 29, lot 8 (4.09);
sec. 30, lots 13 (27.95), 14 (23.75), 37 (6.13).

T. 50 N., R. 100 W.,
sec. 25, lot 4 (10.21);
sec. 32, S½N½;
sec. 35, lot 1 (55.42), NE¼NW¼;
sec. 36, lots 2 (23.92), 6 (15.17).

T. 50 N. R. 101 W.,
sec. 4, lot 5 (38.00), NE¼SW¼;
sec. 6, lots 3 (39.78), 4 (37.05), 5 (37.17), 6 (37.24), 7 (37.31);
sec. 10, NE¼, E½NW¼, NE¼SW¼,N½SE¼;
sec. 14, NE¼NE¼, S½NE¼;
sec. 16, lots 1 (44.75), 6 (20.20), SE¼SE¼;
sec. 18, lot 1 (23.66), NE¼NW¼, SE¼SW¼, SE¼;
sec. 21, lots 1 (22.58), 2 (22.58);
sec. 22, lots 1 (23.19), 2 (23.02), 3 (22.84), 4 (22.67);
sec. 23, lots 1 (19.89), 2 (23.21), 3 (23.26);
sec. 26, lot 1 (16.95), SE¼NE¼;
sec. 29, lots 1 (22.44), 2 (22.47), 3 (22.50), 4 (22.53);
sec. 30, lot 3 (37.87), NE¼NW¼, NE¼SW¼;
* tract 38A (40.00), B (40.00), C (40.00), D (40.00), E (40.00) F (40.00), G (40.00), H (40.00);
tract 52 (80.00).

T. 50 N., R. 102 W.,
sec. 7, lots 10 (0.36), 14 (30.26);
sec. 9, lot 1 (0.09);
sec. 10, lots 1 (0.24), 2 (0.24);
sec. 16, lot 1 (11.49);
sec. 17, SW¼SW¼;
sec. 18, lots 5 (43.59), 7 (37.14), 8 (39.14), 9 (30.75), 10 (31.28), SE¼SE¼;
sec. 19, lots 3 (37.36), 4 (37.31), 5 (30.73), 6 (36.90), W½NE¼, SE¼NE¼, E½W½;
sec. 20, NE¼SE¼;
sec. 22, lot 9 (28.42);
sec. 30, lot 17 (19.74), SE¼SW¼;
sec. 31, lot 1 (4.91).

T. 50 N., R. 103 W.,
sec. 5, lots 1 (6.16), 2 (15.16).

T. 50 N., R. 104 W.,
sec. 1, lots 10 (1.62), 11 (2.93), 14 (3.12);
sec. 2, lot 6 (3.22);

T. 50 N., R. 104 W., (continued)
sec. 5, lot 36 (2.50);
sec. 6, lots 31 (4.82), 34 (1.82);
* sec. 7, lots 16 (24.62), 17 (40.00), 20 (34.23), 25 (5.28), 26 (3.27);
sec. 10, lots 8 (20.30), 10 (24.59), 16 (3.98);
sec. 11, lot 13 (2.24), NE¼NE¼;
sec. 14, lots 7 (2.38), 11 (25.13), 14 (2.45);
sec. 17, lot 7 (2.90).

T. 50 N., R. 105 W.,
sec. 1, SW¼SE¼;
sec. 12, NW¼NE¼.

T. 51 N., R. 95 W.,
sec. 4, lots 17 (21.13), 18 (16.93), 25 (17.13).

T. 51 N., R. 96 W.,
tract 111A (40.33).

T. 51 N., R. 97 W.,
* sec. 7, lot 42 (18.92).

T. 51 N., R. 101 W.,
sec. 3, NW¼SW¼;
sec. 4, lots 1 (45.85), 10 (45.17), 11 (45.19), tract 79B (39.98);
sec. 27, E½SW¼;
sec. 28, lot 2 (38.98), S½SE¼;
sec. 31, lots 1 (39.84), 2 (36.03), 3 (36.89), 4 (36.97), 5 (37.04), W½NE¼, SE¼NE¼, E½W½, NW¼SE¼;
sec. 32, lots 2 (33.23), 3 (39.83), 4 (33.05);
sec. 34, lots 1 (23.24), 2 (23.29);
lot 38A (40.00), B (40.00), C (40.00);
tract 67A (39.94).

T. 51 N., R. 102 W.,
sec. 16, lot 4 (1.56);
sec. 19, SE¼NW¼;
sec. 23, SW¼SE¼;
sec. 26, W½NE¼;
sec. 36, lots 1 (39.08), 6 (25.88), SE¼NE¼, E½SE¼;
tract 72C (9.00);
tract 80A (8.68).

T. 52 N., R. 93 W.,
sec. 7, lots 1 (34.12), 2 (34.21), 4 (26.71), 5 (34.29), 6 (34.38), 7 (25.52), W½E½, E½W½;
sec. 18, lots 1 (23.00), 2 (34.45), 3 (34.50), 4 (34.56), 5 (34.61), NW¼NE¼, SE¼NE¼, NE¼NW¼, SW¼SE¼SW¼, W½SE¼SE¼;
sec. 19, lots 1 (26.25), 2 (29.60), 3 (34.60), 4 (34.50), NE¼NW¼.

T. 52 N., R. 94 W.,
sec. 4, lots 44 B (40.66), C (40.70), D (40.73), E(40.79), F (40.69), G (40.65);
sec. 5, lots 46 A (40.85), B (40.81), C (40.77), D (40.76), E (40.79), F (40.83), G (40.87);
sec. 12, lot 1 (21.20), NE¼, E½NW¼, S½NW¼, S½;
sec. 13;
sec. 24, lots 1 (27.33), 2 (39.93), 3 (27.62), 4 (39.93), 5 (39.43), N½NE¼, NW¼, W½SW¼;
sec. 25, lots 1 (39.42), 2 (28.29), 3 (29.72), W½NW¼.

T. 52 N., R. 95 W.,
sec. 33, lots 1, (22.61), 3 (0.58), 5 (0.30), 8 (15.63), 9 (15.95), S½N½.

T. 52 N., R. 96 W.,
sec. 15, SW¼NW¼;
sec. 20, lot 23 (29.23);
tracts 90H (41.01), I (41.29).

T. 52 N., R. 101 W.,
sec. 1, lot 5 (26.74), tract 41S (24.81), T (24.83);
sec. 2, lot 5 (21.74);

T. 52 N., R. 101 W., (continued)
* sec. 17, lots 1 (53.02), 2 (53.15), 3 (53.29), 4 (32.71), W½W½, SE¼SW¼;
sec. 18, E½;
* sec. 20, W½NW¼, N½N½NE¼SW¼;
sec. 33, lot 4 (43.66).

T. 52 N., R. 102 W.,
* sec. 11, lots 1 (34.45), 2 (34.52), 5 (23.44), 6 (25.35), 9 (26.42);
sec. 12, N½NW¼SW¼;
sec. 13, W½W½NW¼;
sec. 14, lots 1 (37.15, 3 (37.48), NE¼, N½N½SE¼;
sec. 16, lots 1 (41.46), 2 (26.18), 3 (24.10), NE¼NE¼.

T. 52 N., R. 103 W.,
sec. 5, lots 1 (55.57), 17 (42.86) NW¼SW¼;
sec. 6, lots 2 (55.86), 3 (55.85), 4 (45.25), 5 (32.40), 6 (40.00), 7 (40.00), 10 (40.00), 11 (40.00), 12 (32.43);
sec. 7: lot 3 (32.52).

T. 52 N., R. 104 W.,
sec. 1, lots 5 (56.05), 6 (56.14), 7 (56.24), 8 (56.33), 10 (40.00), 11 (40.00), 12 (40.00);
sec. 2, lots 5 (56.39), 8 (56.43), 9 (40.00), 16 (40.00);
sec. 3, lots 5 (56.39), 6 (56.30), 7 (56.20), 8 (56.11), 9 (40.00), 10 (40.00), 11 (40.00), 12 (40.00), 13 (40.00), 14 (40.00), 15 (40.00), 16 (40.00), N½SW¼, SE¼SW¼, SE¼;
sec. 4, lots 5 (56.00), 6 (51.22), 10 (55.60), 11 (40.00), 15 (30.96), 16 (40.00), 17 (40.00), NE¼SE¼;
sec. 10, N½NE¼, NE¼NW¼;
sec. 14, lots 10 (0.91), 11 (1.27), 26 (4.90), 27 (0.02);
sec. 15, lots 21 (11.14), 22 (9.81), 23 (4.51);
sec. 16, lots 21 (3.10), 22 (11.63), 27 (14.35);
sec. 19, tract 45 lots 35 (12.26) 44 (21.89), 45 (12.53);
sec. 30, lots 9 (3.59), 14 (3.52), 26 (3.44), 32 (2.34).

T. 52 N., R. 105 W.,
sec. 13, lot 6 (38.48);
sec. 14, lots 1 (37.88), 2 (38.12), 3 (38.36), 4 (37.11), 5 (38.72), 7 (38.91), SE¼NE¼, SE¼NW¼, N½SE¼;
sec. 24, NE¼SW¼;
sec. 25, lot 4 (39.09), S½NW¼, NW¼SE¼.

T. 53 N., R. 93 W.,
sec. 19, lots 2 (34.21), 3 (39.30), 4 (39.34), 7 (39.38), 8 (39.42), SW¼NW¼, E½SW¼, W½SE¼, SE¼SE¼;
sec. 29, W½NW¼, SW¼;
sec. 30, lots 1 (39.46), 2 (39.50), 3 (39.54), 4 (39.58), E½, E½W½, E½;
sec. 31, lots 1 (39.65), 2 (39.75), 3 (39.85), 4 (39.95), NE¼, E½W½, N½SE¼;
sec. 32, lots 3 (33.88), 4 (33.33), N½NW¼, N½SE¼NW¼, E½SW¼SE¼, SE¼SE¼.

T. 53 N., R. 94 W.,
sec. 13, SW¼, E½SE¼, SE¼SE¼;
sec. 24.

T. 53 N., R. 100 W.,
* sec. 30, lot 8 (18.92);
* sec. 31, lots 5 (50.64), 6 (50.65), 7 (50.65), 8 (50.66), tract 41E (40.00), F (40.00), K (40.00), L (40.00), M (15.17), N (15.19).

T. 53 N., R. 101 W.,
* sec. 11, S½N½SW¼NE¼, S½SW¼NE¼, NE¼SE¼NW¼;
sec. 25, lots 5 (14.98), 6 (29.33), 7 (21.59), 8 (14.93);
* sec. 36, lots 1 (18.27), 2 (35.98), 3 (29.34), 4 (18.01), 5 (35.89), 6 (29.34).

T. 53 N., R. 102 W.,
sec. 4, lot 8 (39.56);

T. 53 N., R. 102 W., (continued)
sec. 5, lots 5 (1.63), 6 (31.43), NE¼SE¼;
sec. 7, lots 10 (29.40), 11 (37.25), 12 (19.76), SE¼SE¼;
sec. 8, SW¼SW¼, W½SE¼, SE¼SE¼;
sec. 16, lots 1 (12.59), 2 (15.92);
sec. 17, lots 1 (12.28), 2 (11.95).

T. 53 N., R. 103 W.,
sec. 12, lot 10 (9.71);
sec. 31, lots 5 (40.11), 6 (40.07), 7 (40.05), 8 (40.01), NE¼NW¼, SE¼SW¼;
sec. 32, E½NW¼, E½SW¼, W½SE¼;
sec. 33, SE¼NW¼.

T. 54 N., R. 92 W.,
sec. 17, S½NW¼NW¼, N½SW¼NW¼;
sec. 18, S½NE¼NE¼, NW¼NE¼, N½NE¼NW¼.

T. 54 N., R. 94 W.,
sec. 19, lots 1 (37.90), 2 (38.10), 3 (38.22), 4 (38.34), E½W½.

T. 54 N., R. 95 W.,
sec. 24, E½.

T. 54 N., R. 97 W.,
sec. 8, W½NW¼SW¼.

T. 54 N., R. 100 W.,
* sec. 7, lots 34 (12.80), 35 (25.08), 46 tract 10 (10.41), tract 11 (8.58), tract 19 (17.06).

T. 54 N., R. 102 W.,
sec. 1, NW¼SW¼, S½SW¼, SW¼SE¼;
sec. 2, SE¼SE¼;
sec. 4, NE¼SE¼;
sec. 5, lot 8 (39.64);
sec. 9, lot 1 (23.22);
sec. 11, lot 5 (22.67), NW¼NE¼, NE¼SE¼;
sec. 14, lots 1 (17.29), 2 (32.27), NE¼NW¼;
tract 62 G (40.00).

T. 55 N., R. 93 W.,
sec. 5, S½S½NE¼, S½SE¼NW¼, S½NE¼SW¼, N½SW¼SW¼, S½N½SE¼, N½SE¼SE¼;
sec. 6, lot 8 (17.85), S½NE¼SW¼.

T. 55 N., R. 96 W.,
sec. 6, lots 1 (39.72), 2 (39.80), 7 (40.00).

T. 55 N., R. 97 W.,
sec. 2, lots 2 (37.32), 4 (37.41), 6 (35.81), 7 (40.12), 8 (41.56), 40B (40.00);
sec. 3, lot 2 (43.32);
sec. 9, lots 1 (46.95), 2 (52.87), 5 (36.10);
sec. 10, lots 1 (39.53), 2 (42.92), 5 (35.91), 6 (35.90), N½SW¼;
sec. 11, lot 2 (2.09);
sec. 31, W½W½NE¼, W½SE¼SW¼NE¼, E½NW¼SE¼.

T. 55 N., R. 98 W.,
* tract 59, I(40.24), J(40.24), K(40.24), L(40.24), M(40.26), N(40.26), O(40.26), P(40.26).

T. 55 N., R. 100 W.,
* sec. 5, N½NE¼NW¼SE¼, N½S½NW¼NW¼SE¼, N½S½NE¼NW¼SE¼;
* sec. 15, Remaining portion of Farm Unit C (120.00);
* sec. 21, lots 7 (6.04), 9 (9.39), 10 (0.92), lot 101 tract 8 (19.99), lot 101 tract 11 (13.33), lot 101 tract 13 (0.29);
* sec. 23: tract 100 F(40.60), M(40.60).

T. 55 N., R. 102 W.,
sec. 26, SE¼NE¼;
sec. 33, NE¼SW¼, SW¼SE¼;
sec. 34, SW¼SE¼;
sec. 35, E½SW¼.

T. 55 N., R. 103 W.,
sec. 4, lot 9 (19.91), 10 (20.04), 13 (20.16), SW¼SW¼;
* sec. 5, SW¼SW¼;
sec. 8, SW¼NE¼;
sec. 9, SE¼SE¼;
sec. 10, S½S½;
sec. 11, lot 3 (38.15), SW¼SW¼, SW¼SE¼;
sec. 12, lot 8 (21.30);
sec. 14, SW¼NW¼, NW¼SW¼;
sec. 15, NW¼NE¼, NW¼SE¼;
sec. 17, SE¼NW¼;
sec. 18, lots 7 (36.35), 8 (36.34), SW¼NE¼, NE¼SW¼.

T. 56 N., R. 93 W.,
sec. 11, SW¼NE¼;
sec. 27, lot 7 (7.54);
sec. 28, lot 6 (8.43);
sec. 33, lot 1 (36.00);
sec. 34, lots 2 (31.25), 3 (36.00).

T. 56 N., R. 94 W.,
sec. 17, lot 58D (41.00).

T. 56 N., R. 95 W.,
sec. 17, lot 9 (16.77);
sec. 20, W½NE¼NW¼, NE¼NW¼NW¼;
sec. 30, NE¼, E½SW¼, N½SE¼;
sec. 31, lots 1 (34.92), 2 (35.00), 3 (35.00), 4 (35.16); E½W½.

T. 56 N., R. 96 W.,
sec. 2, lot 12 (45.81);
sec. 3, lots 86A (40.00), 86B (41.47), 86C (41.43), 86G (41.50), 86H (40.00);
sec. 30, lots 7 (40.90), 8 (9.73);
sec. 31, lots 3 (36.70), 4 (36.79), E½W½, W½E½, SE¼SE¼.

T. 56 N., R. 97 W.,
sec. 21, N½NE¼, SE¼NE¼;
sec. 22, lots 3 (24.66), 4 (31.05), 9 (28.21), 8 (9.00), 47D (41.60), NW¼, N½SW¼;
sec. 27, lots 47E (41.65), 54E (42.78);
* sec. 33, lot 1 (17.80);
sec. 36, lots 2 (38.83), 3 (47.24), 6 (0.32).

T. 56 N., R. 98 W.,
* sec. 6, lots 9 (40.00), 10 (remaining 15 acres), E½ of lot 29 (5.00), 31 (10.00), 32 (10.00), 33 (10.00), E½NW¼SE¼, E½E½SW¼SE¼.

T. 56 N., R. 99 W.,
sec. 17, lot 6 (25.86);
* sec. 24, lot 46 (40.00).

T. 56 N., R. 103 W.,
sec. 23, lot 5 (40.63);
sec. 27, lots 3 (29.18), 4 (47.75), 5 (19.42), 6 (19.22), 7 (27.94), 9 (28.54), 10 (32.52), 11 (12.32);
sec. 34, lot 1 (26.09);
sec. 36, lots 5 (46.56), 6 (30.27).

T. 57 N., R. 92 W.,
sec. 5, SW¼SW¼.

T. 57 N., R. 93 W.,
sec. 24, SW¼SW¼;
sec. 25, SE¼SW¼.

T. 57 N., R. 96 W.,
sec. 28, N½NW¼;
sec. 35, W½SW¼, SE¼SE¼.

T. 57 N., R. 97 W.,
* sec. 6, lot 7 (39.00), S½SW¼, SW¼SE¼;
* sec. 7, lot 1 (39.22), NW¼NE¼, N½SW¼NE¼, E½NW¼;
* sec. 16, SW¼SW¼;
* sec. 18, S½NW¼SE¼;

T. 57 N., R. 97 W., (continued)
* sec. 27, E½NW¼ (FmUC);
* sec. 28, tract 2 (7.84), 3 (52.97), 6 (60.70), E½NW¼;
* sec. 29, tract 6 (1.82), tract 19 (18.87);
* sec. 30, tract 30 (8.63);
* sec. 32, tract 6 (1.82).

T. 57 N., R. 98 W.,
* sec. 4, lots 1 (40.67), 2 (40.57), 3 (40.47), 4 (40.37), S½N½, S½;
sec. 8, S½;
sec. 12, tract 1 (91.30), Fm UJ tract 4 (111.11);
sec. 27, tract 1 (7.19), 4 (25.98), 5 (44.55), 8 (62.51).

T. 57 N., R. 99 W.,
sec. 2, lots 1 (39.44), 2 (39.39), 3 (39.33), 4 (39.27), S½N½, S½;
sec. 4, lots 1 (39.34), 2 (39.22), 3 (39.10), 4 (38.97), S½N½, S½;
sec. 8;
* sec. 10;
* sec. 14, W½;
sec. 20.

T. 57 N., R. 100 W.,
sec. 4, lots 2 (40.87), 3 (40.85), 4 (40.82), S½N½, S½;
sec. 6, lots 1 (40.42), 2 (40.30), 3 (40.18), 4 (44.00), 5 (43.79), 6 (43.64), 7 (43.48), S½NE¼, SE¼NW¼, E½SW¼, SE¼;
sec. 8;
sec. 10, lots 1 (34.18), 2 (34.17), 3 (34.17), 4 (34.16), E½, E½W½;
sec. 14;
sec. 18, lots 1 (42.62), 2 (42.45), 3 (42.27), 4 (42.09), E½, E½W½;
sec. 20;
sec. 22, lots 1 (34.58), 2 (34.52), 3 (34.48), 4 (34.42), E½, E½W½;
sec. 24;
sec. 26;
sec. 28.

T. 57 N., R. 101 W.,
sec. 4, lot 4 (38.19), SW¼NW¼, W½SW¼, SE¼SW¼, S½SE¼;
sec. 6, E½SE¼;
sec. 7, NE¼NE¼;
sec. 8;
sec. 10, SW¼NE¼, W½NW¼, SE¼NW¼, SW¼, W½SE¼, SE¼SE¼;
sec. 14;
* sec. 18, lots 1 (40.00), 2 (40.00), 3 (28.28), 4, 28.28, 5 (40.00), 6 (40.00), 7 (40.00), 8 (40.00), 9 (28.28), 10 (28.29), 11 (40.00), 12 (40.00, E½, E½W½.

T. 57 N., R. 102 W.,
sec. 4, lots 1 (38.24), 2 (38.00), 3 (37.76), 4 (37.52), S½N½, S½;
sec. 6, lots 1 (37.58), 2 (38.26), 3 (38.95), 4 (47.03), 5 (45.45), 6 (43.75), 7 (42.05), S½NE¼, SE¼NW¼, E½SW¼, SE¼;
sec. 8;
sec. 10;
sec. 13, E½NE¼;
sec. 18, lots 2 (41.05), 3 (41.27), 4 (41.49), E½;
sec. 22, SW¼SE¼;
* sec. 24, SW¼NW¼, SE¼SE¼;
* sec. 26, NE¼, SE¼NW¼, SW¼, N½SE¼, SW¼SE¼;
sec. 28, S½;
sec. 30, lots 3 (41.35), 4 (41.41),SE¼NE¼, E½SW¼, SE¼;
sec. 32;
sec. 34.

T. 57 N., R. 103 W.,
sec. 12, N½NE¼, SE¼NE¼, NE¼SE¼;

T. 57 N., R. 103 W., (continued)
sec. 24, lots 1 (34.07). 2 (34.32), 3 (34.69), 4 (35.20) W½E½, W½.

T. 58 N., R. 96 W.,
sec. 22, lots 1 (37.96), 2 (37.89), 3 (37.81).

T. 58 N., R. 97 W.,
sec. 22, lot 4 (22.24), S½SW¼NE¼, S½NW¼, S½;
sec. 24, lots 1 (23.22), 2 (23.10), 3 (22.98), 4 (22.86), S½NE¼, N½SW¼NW¼, SE¼NW¼, N½NE¼SW¼, SW¼SW¼, SW¼SE¼SW¼, N½SE¼, N½SW¼SE¼, SE¼;
sec. 26;
* sec. 28, E½.

T. 58 N., R. 98 W.,
sec. 20, SE¼SE¼;
* sec. 24, lots 3 (20.50), 4 (20.90), 5 (4.99), 6 (5.01), 7 (10.10), S½NW¼, SW¼;
* sec. 25, W½;
* sec. 28;
sec. 30, lots 1 (34.02), 2 (34.06), 3 (34.11), 4 (34.17), E½, E½W½;
sec. 34.

T. 58 N., R. 99 W.,
sec. 21, S½N½, W½SE¼, SE¼SE¼;
sec. 22, lots 1 (21.90), 2 (21.70), S½NW¼;
sec. 23, SE¼;
sec. 24, lots 3 (22.23), 4 (22.44), S½NW¼, S½;
sec. 27, NE¼;
sec. 33, E½.

T. 58 N., R. 100 W.,
sec. 20, lots (17.72), 2 (17.12), 3 (16.52), 4 (16.49), S½N½, S½;
sec. 28;
sec. 30, lots 1 (34.92), 2 (35.04), 3 (35.16), 4 (35.28), E½W½;
sec. 32, lots 1 (40.31), 2 (40.17), 3 (40.13), 4 (40.29), N½, N½S½.

T. 58 N., R. 101 W.,
sec. 18, lots 3 (46.34) 4 (14.80), 5 (14.80), 6 (37.00), 7 (40.00), 8 (40.00);
* sec. 30, lots 1 (40.00), 2 (40.00), 3 (26.53), 4 (26.77), 5 (40.00), NE¼NW¼.

T. 58 N., R. 102 W.,
sec. 16, lots 1 (16.35), 2 (16.45), 3 (16.55), 4 (16.65), S½S½;
sec. 18, lots 1 (18.12), 2 (18.36), 3 (18.60), 4 (23.52), 5 (48.42), SE¼SW¼, S½SE¼;
sec. 20, NE¼NE¼, S½NE¼, W½, SE¼;
sec. 26, NE¼, N½NW¼, SE¼NW¼;
sec. 28;
sec. 32, S½;
sec. 34; N½N½, SW¼, S½SE¼;
* sec. 35, SW¼SE¼.

PROPOSED EXCHANGES

Introduction

Recently proposed land exchanges are listed below. The BLM-administered lands in the proposals have been tentatively identified as suitable for exchange, subject to review of land disposal cri-

teria and site-specific environmental analyses. These land descriptions are general and subject to modification. (Any other exchange proposals would be considered individually.)

Franklin Floyd Proposed Exchange

Lands for BLM acquisition:

T. 55 N., R. 94 W.,
sec. 20, lots 2 (35.81), 3 (31.97);
sec. 21, lot 8 (43.99).

Lands for BLM disposal:

T. 52 N., R. 104 W.,
sec. 7, lots 16,23, SE¼ of lot 24, E½SE¼NE¼, E½SE¼;
sec. 8, S½NW¼NW¼, W½NW¼SW¼NW¼,
SW¼SW¼NE¼, NW¼NW¼SW¼,
E½SW¼NW¼SW¼, West 180.8 feet of lot 4;
sec. 18, lots 30, 43, (comprising 274.82 acres).

E. O. Somerwine Proposed Exchange

Lands for BLM acquisition:

T. 52 N., R. 104 W.,
sec. 6, lots 13 (56.75) 14 (52.24).

Lands for BLM disposal:

T. 52 N., R. 104 W.,
sec. 4, lots 10 (55.60), lot 11 (40.00), NW¼SW¼;
sec. 5, NE¼SE¼.

Dan Brown Proposed Exchange

Lands for BLM acquisition:

T. 53 N., R. 93 W.,
sec. 18, lots 2 (33.74), 3 (50.26).

T. 53 N., R. 94 W.,
sec. 13, lot 1 (30.19).

Lands for BLM disposal:

T. 52 N., R. 88 W. (Washakie RA),
sec. 9, SE¼NE¼

T. 56 N., R. 94 W.,
sec. 28;
sec. 29;
sec. 32;
sec. 33.

T. 55 N., R. 94 W.,
sec. 4;
sec. 5.

POSSIBLE FUTURE ACQUISITIONS

Wildlife Habitat Management Enhancement

The following private lands have been identified for possible future acquisition to enhance wildlife habitat management.

Carter Mountain Management Enhancement

The following private lands have been identified for possible future acquisition to enhance management in the Carter Mountain proposed ACEC.

T. 49 N., R. 103 W.,
sec. 9, tract 43 (80.00);
sec.16, tract 42 (640.00);
sec.19, NE¼NE¼;
sec.21, tract 41 (80.00).

Wetland/Riparian Management Enhancement

To improve management of wetland/riparian areas, the following lands along streams surrounded by public lands have been identified for possible future acquisition . Land descriptions are approximate. Private lands within these general areas would be identified for possible acquisition by exchange.

Bureau acquisition lands:

T. 45 N., R. 91 W.,
sec. 28, SE¼ NW¼, NE¼ SW¼, SW¼ NE¼, NW¼ SE¼.

T. 45 N., R. 92 W.,
sec. 4, SE¼SE¼;
sec. 9, NE¼NW¼, N½NE¼;
sec. 14, NW¼SW¼;
sec. 16, SE¼NW¼;
sec. 18, S½NW¼, W½NW¼SW¼;
sec. 22, SW¼SE¼, S½SW¼;
sec. 27, NW¼NW¼.

T. 45 N., R. 93 W.,
sec. 13, E½SE¼.

T. 49 N., R. 102 W.,
sec. 2, N½NW¼, SE¼NW¼, NW¼NW¼, E½NW¼,
W½W½NE¼;
sec. 6, S½SW¼, SW¼SE¼;
sec. 7, S½, NE¼, NW¼NW¼;
sec. 17, NW¼SE¼, NW¼;
sec. 18, N½;
sec. 19, S½NW¼NW¼.

T. 49 N., R. 103 W.,
sec. 1, SE¼, SE¼NE¼;
sec. 3, S½;
sec. 4, W½, W½NE¼, NE¼NE¼, W½SE¼, SE¼SE¼;
sec. 5;
sec. 6, SE¼ NE¼, SE¼SW¼;
sec. 7, NE¼, NE¼NW¼;
sec. 8, N¾;

T. 49 N., R. 103 W., (continued)
sec. 9, N½, E½, E½SW¼, NE¼SE¼;
sec. 12, E½SW¼, SW¼SW¼, N½NE¼;
sec. 13, SW¼SE¼, NE¼SW¼, NW¼;
sec. 14, E½E½, W½NE¼, E½NW¼,
sec. 15, E½NW¼;
sec. 16, N½NE¼NE¼;
sec. 20, E½E½NE¼;
sec. 21, W½NW¼;
sec. 23, N½NE¼, NE¼NW¼, SW¼NW¼, S½SE¼;
sec. 24, NE¼NE¼, SW¼, NW¼NW¼;
sec. 27, SW¼, S½S½NW¼;
sec. 28, N½SE¼, S½NE¼, NW¼NE¼, E½NW¼;
sec. 34, N½NW¼.

T. 50 N., R. 100 W.,
sec. 7, W½SW¼, N½SE¼, SE¼NE¼;
sec. 10, W½NE¼, SE¼NE¼, E½SE¼;
sec. 14, S½SW¼;
sec. 15, E½NE¼, NE¼SE¼;
sec. 22, S½;
sec. 23, NW¼NE¼, NE¼NE¼, N½NW¼NW¼, E½SE¼;
sec. 27, NW¼NE¼.

T. 50 N., R. 102 W.,
sec. 33, W½SE¼, NE¼SW¼, SE¼SW¼;
sec. 34, SE¼SW¼, S½SE¼.

T. 52 N., R. 95 W.,
sec. 3, S½SW¼;
sec. 4, S½S½, N½SW¼;
sec. 5, NW¼, S½NE¼, NW¼NW¼, NE¼SE¼;
sec. 10, N½;
sec. 11, S½NW¼.

T. 52 N., R. 96 W.,
sec. 4, N½;
sec. 5, SE¼;
sec. 7, S½NE¼, W½SE¼, S½SW¼.

T. 52 N., R. 97 W.,
sec. 12, S½SE¼, SE¼SW¼;
sec. 22, NW¼.

T. 53 N., R. 90 W.,
sec. 17, SE¼SW¼, W½SE¼.

T. 53 N., R. 95 W.,
sec. 31, S½;
sec. 32, SW¼, W½SE¼, W½W½SE¼.

T. 53 N., R. 96 W.,
sec. 34, S½SE¼;
sec. 35, S½,

sec. 36, S½.

T. 56 N., R. 93 W.,
sec. 17, S½SW¼, W½SE¼;
sec. 18, SE¼SE¼, S½S½SE¼SW¼;
sec. 19, NW¼NW¼, N½NE¼.

T. 56 N., R. 94 W.,
sec. 14, S½SE¼;
sec. 23, NE¼NE¼;
sec. 24, N½N½.

T. 56 N., R. 102 W.,
sec. 5, S½SW¼, SW¼SE¼;
sec. 8, W½W½;
sec. 17, E½, E½SE¼;
sec. 18, E½SE¼SE¼;
sec. 19, SE¼, E½E½NE¼;
sec. 20, W½W½;
sec. 30, W½E½;
sec. 31, W½NE¼.

T. 56 N., R. 103 W.,
sec. 7, SE ¼SW¼, SW¼SE¼, NE¼SE¼, SE¼NE¼;
sec. 8, NW¼.

APPENDIX F

WITHDRAWALS AND CLASSIFICATIONS

Table F-1 shows the existing and proposed locatable mineral withdrawals, table F-2 shows the summary of withdrawal implications to land management, and table F-3 shows the existing withdrawals and classifications.

TABLE F-1

EXISTING AND PROPOSED LOCATABLE MINERAL WITHDRAWALS

Area	Alternative (in acres)			
	A	B	C	D
Proposed ACECs				
Carter Mountain	0	0	7,819	7,819
Chapman Bench[1]	14,156	0	15,400	15,400
Five Springs Falls[1]	160	0	160	160
Little Mountain	528	528	20,510	528
Sheep Mountain Anticline	0	0	19,000	19,000
Bighorn River Tracts	0	0	2,500	2,500
Heart Mountain Relocation Site[1]	320	0	320	320
Newton Lakes Recreation Area[1]	0	0	160	160

[1] Portions of the Chapman Bench proposed ACEC, the Heart Mountain Relocation Site, and the Newton Lakes recreational area are segregated against locatable mineral exploration and development by BOR withdrawals. The Five Springs Falls proposed ACEC formerly was segregated by a C&MU classification which has been terminated; however, these lands have not been reopened to locatable mineral development.

TABLE F-2

SUMMARY OF WITHDRAWAL IMPLICATIONS TO LAND MANAGEMENT

Withdrawal or Classification	Segregative Effect	Discussion	Problem
Public water reserve withdrawals	Prohibits disposal, agricultural entry, or nonmetalliferous mineral entry. Protects water sources.	Very few water sources in the planning area are present in the same vicinity as economic nonmetalliferous locatable minerals. Water sources can be adequately protected through 43 CFR 3809 and Executive orders 11988 and 11990. A number of public water reserve withdrawals have been placed on land where not water source exists.	Constrains mineral exploration/development and other land uses. Segregative effect reduces management flexibility. Protects water sources that do not exist in some cases.
Administrative site withdrawals	Prohibits disposal, agricultural entry, and mineral entry.	Most administrative site areas do not have economic locatable mineral resources or costly improvements. Except for existing Ranger Station locations, improvements could be adequately protected by right-of-way and through use of 43 CFR 3809.	Constrains mineral exploration/development and other land uses. Segregative effect reduces management flexibility.
Small tracts classification	Prohibits disposal, agricultural entry, and mineral entry.	Small Tract Act was repealed by FLPMA.	Constrains mineral exploration/development and other land uses, especially since no leases or disposals can be completed under the Small Tract Act.
R&PP classifications (not leased)	Prohibits disposal, agricultural entry, and mineral entry.	No R&PP applications have been received or are expected on this site. Land can be reclassified if necessary.	Constrains mineral exploration/development and other land uses. R&PP is located near oil wells and is no longer a suitable location for lease.
Desert Land classification (cancelled and relinquished)	Subject to mineral location prior to patent.	No new applications have been received or are expected on these sites. Lands can be reclassified if necessary.	Constrains mineral exploration/development and other land uses, especially when no DLEs have been received.

TABLE F-2 (Continued)

SUMMARY OF WITHDRAWAL IMPLICATIONS TO LAND MANAGEMENT

Withdrawal or Classification	Segregative Effect	Discussion	Problem
Classification and multiple use	Prohibits disposal under R.S. 2455 and agricultural entry. A total of 7,000.69 acres further segregated from mineral entry (Big Horn County).	Established to classify lands for retention and multiple use management or for disposal.	Constrains land use. Places protections on the lands that are now accomplished by FLPMA.
Stock driveway	Prohibits disposal and agricultural entry. Open to mineral entry with certain restrictions. Protects water resources.	Established to protect stock trails.	Some of the approximately 52,800 acres withdrawn are not being used for trailing purposes. Withdrawn lands will need to be reviewed so that lands not being used for trailing can be opened for other uses.

TABLE F-3

EXISTING WITHDRAWALS AND CLASSIFICATIONS

Type	Acres Withdrawn Or Classified	Segregative Effect	Agency Jurisdiction[1]	Review Status
R&PP classifications Held by lessee Classified only	 705 19	Prohibits mineral and agricultural entry and disposal.	BLM	Pending review
DLE classifications: Relinquished Cancelled by decision	 640 637	Prohibits mineral entry and disposal.	BLM	Pending review
Administrative site withdrawal	272	Prohibits mineral and agricultural entry and disposal.	FS	Pending review
Reclamation withdrawals[2]	358,891	Prohibits mineral and agricultural entry and disposal.	BLM/BOR[2]	Pending review
Military withdrawal (Lovell target range)	3,543	Prohibits mineral and agricultural entry and disposal.	DOD	Pending review
Power reserve withdrawals	4,870	Prohibits agricultural entry entry and disposal. Limits mineral entry.	FERC	April 30, 1986, FERC continued certain Federal Power Act (FPA) power project withdrawals which were created by the filing of applications for permits or licenses. Power projects which were not continued were vacated en masse, effective April 30, 1986. FERC has agreed to update their list of current power projects on a regular basis and submit to BLM.
Power site withdrawals	11,618	Prohibits agricultural entry. and disposal. Limits mineral entry.	BLM	Pending review
Stock driveway withdrawals	52,800	Prohibits agricultural entry and disposal. Protects water sources. Limits mineral entry.	BLM	December 8, 1983 Federal Register publication continued the existing withdrawals for a 20-year period.
Reservoir sites withdrawals	56,214	Prohibits mineral and agricultural entry and disposal.	BOR[2]	Pending review
Public water reserve withdrawals	2,201	Prohibits nonmetalliferous mineral agricultural entry and disposal. Protects water sources.	BLM	Pending review

TABLE F-3 (Continued)

EXISTING WITHDRAWALS AND CLASSIFICATIONS

Type	Acres Withdrawn Or Classified	Segregative Effect	Agency Jurisdiction[2]	Review Status
C&MU classifications Park County Big Horn County (Minerals Only)	 387,348 112,400 (7,000)	Prohibits agricultural entry and disposal. May prohibit mineral entry.	BLM	C&MU classifications were reviewed in 1981. The lands in the Park County C&MU were all restored to the public land laws. The Big Horn County C&MU classification was partially terminated and 109,559.73 acres were opened to the agricultural land laws and sales. 200 acres were opened to the general mining laws.

Note: Proposed BLM-initiated protective withdrawals are shown in table F-1. Table F-2 shows the segregations associated with withdrawals and classifications shown in this table.

[1] BLM =[1] Bureau of Land Management, U.S. Department of the Interior; BOR = Bureau of Reclamation, U.S. Department of the Interior; DOD = Department of Defense; FERC = Federal Energy Regulatory Commission; FS = Forest Service, U.S. Department of Agriculture.

[2] The acreage shown for BOR withdrawals includes private lands within the original withdrawals that have been patented since the time of the withdrawals.

APPENDIX G

LIVESTOCK GRAZING MANAGEMENT

VEGETATION INVENTORY METHODS AND HISTORY IN THE PLANNING AREA

Background

In December 1982, the BLM adopted as its principal rangeland inventory method the Range Site Inventory procedure described in the Soil Conservation Service (SCS) *National Range Handbook*. This procedure involves the correlation of a soil series to a specific range site. A range site is a distinctive kind of rangeland that differs from other types of rangeland in its ability to produce a characteristic natural plant community. The species composition and total production levels vary between range sites, providing different potentials, objectives, and stocking capabilities for each specific plant community.

Inventories in the Planning Area

The Cody range staff conducted a vegetative inventory to meet the requirements addressed in the Federal Land Policy and Management Act of 1976 and the Public Rangelands Improvement Act of 1978 during 1984 through 1986. The method involved the ocular estimation of plant species composition, production, and plant cover for each delineated site. The seral stage (ecological condition) of each range site was then recorded, or if more than one stage existed within a given range site, that site was listed under two or more seral stages.

Ecological condition classes were determined by comparing the present plant community with that of the climax plant community or potential as indicated by the SCS range condition guide for the site. Four classes are used to express the degree that a present plant community reflects its potential climax community: for example, if the seral stage or ecological status represents 76% to 100% of the climax plant community, it is rated excellent; 51% to 75% (late seral), good; 26% to 50% (mid-seral), fair; or 0% to 25% (early seral, poor.

The SCS range site guides used in the Cody Planning Area did not accurately reflect the true production capabilities of the inventoried plant communities in some cases. For example, some range sites in the planning area that would be in good condition because of plant species composition alone did not have a sufficient level of vegetative production to correspond to a good condition rating as suggested in the range site guides. Therefore, the ecological condition classes shown in table G-2 and in chapter 4 may not convey the true condition of the rangeland in the planning area without further analysis. However, ecolgoical condition as displayed represents a baseline or starting point for establishing mangement objectives for fufutre range condition, for providng reasible stocking level proposals, and for measuring range improvement over time.

The ecological condition classes assigned to each range site were further adjusted, if necessary, on the basis of current production levels obtained in the specific geographical area around Cody. A condition rating based on the percentage of composition alone may need adjustment if the total production is less than that characteristic for the condition class. This concept is in accordance with the SCS National Range Handbook (305.5(a)) for the determination of range condition classes. Annual climatic data was also considered before a condition class was adjusted because of lower production levels.

The final condition classes by range site were associated with a proposed stocking level, as suggested by the Soil Conservation Service in its range site descriptions. This information was used to establish proposed stocking rates for the preferred alternative in conjunction with management objectives specific to each allotment. However, since no one-time inventory can accurately and consistently determine livestock grazing capacity and many variables are associated with each site (climatic fluctuations, seasons of use, and distribution), preference would be allowed until data can be obtained through a three- to five-year monitoring program.

Time and funding constraints prevented a complete inventory of the Cody planning area. However, approximately 814,423 acres have been mapped by range site. This represents 75% of the total planning area. The remaining acres are to be mapped as time and personnel become available. The inventory effort was concentrated on allotments that had been tentatively placed in "I" cate-

gory because of existing management, vegetative condition or resource conflicts (allotment categorization is described in the next section of this appendix).

Concerns expressed by other resource specialists provided the basis for assigning priority to areas requiring vegetative information for the determination of actual resource conflicts. As a result of this interdisciplinary approach in tentative categorization of the allotments, the range staff was able to obtain vegetative information on all the final "I" category allotments and a large portion of the "M" and "C" allotments within the planning area.

THE ALLOTMENT CATEGORIZATION PROCESS

Assignment of Category

The criteria used for the placement of the allotments into the categories were based on resource potential, resource use conflicts or controversy, opportunity for positive economic return on public investments, and the present management situation. The specific criteria used for each category are as follows:

Category "M": Maintain Existing Resource Conditions

The present range condition and management are satisfactory

Good to excellent condition and will be maintained under present management, or

Fair condition and improving with improvement expected to continue under present management, or

Opportunities for BLM management are limited because percentage of public land is low or acreage of public lands is small.

Allotment has a potential for moderate or high vegetative production and is producing at or near this potential.

There are no significant land-use resource conflicts with livestock grazing.

Landownership status may or may not limit management opportunities.

Opportunities for positive economic return from public investment may exist.

Category "I": Improve Existing Resource Conditions

Present range condition is unsatisfactory.

Range condition is poor to fair.

Range condition is fair to good.

Range condition is expected to decline further.

Present grazing management is not adequate.

Allotment has potential for medium to high vegetative production but production is low to moderate.

Resource conflicts/controversy with livestock grazing are evident.

There is potential for positive economic return on public investment.

Category "C": Custodial Management

Present range condition is not in a downward trend.

Allotment has a low vegetative production potential and is producing near this level.

There may or may not be limited conflicts between livestock grazing and other resources.

Present management is satisfactory or is the only logical management under existing conditions.

Opportunities for positive economic return on public investments do not exist.

Management Objectives

"M" Allotments

To authorize actions that are consistent with or will maintain current uses and satisfactory range condition and productivity. Monitoring studies will be established at a level that will detect changes in present resource management and/or condition. The intensity and workload requirements of the studies will depend on the resource values involved.

"I" Allotments

To implement management actions that will improve existing resource condition and productivity and enhance overall multiple use opportunities. Monitoring will be carried out at an intensity sufficient to support actions taken toward achieving management objectives and will be implemented on a priority basis. Monitoring will continue at a lower intensity to ensure the effectiveness of the actions.

"C" Allotments

To manage the allotment in a custodial manner while protecting the existing resource values. Management actions will emphasize the issuance of billings, grazing leases, and transfers. Monitoring will consist of periodic allotment inspections and use supervision to detect possible changes in existing resource values. A specific schedule for monitoring will not be developed, but monitoring will be conducted as the opportunity arises in conjunction with other range management work.

CURRENT GRAZING ALLOTMENT INFORMATION

Table G-1 lists livestock grazing information specific to each allotment in the planning area.

Table G-2 shows the range condition for each inventoried allotment. About 75% of the planning area was included in the ecological condition class inventory. Because the inventory focused on "I" category allotments and areas of preceived vegetation conflicts, ecological condition for the planning area as a whole may be somewhat better than conditions shown by the inventory. Ecological condition could also be subject to modificaiton based on further analysis of SCS ragne guidelines in the Bioghorn Basin as described previously in this appendix.

PROBLEMS, CONFLICTS AND OPPORTUNITIES IN GRAZING MANAGEMENT

Identification of Problems

Through consultation with grazing permittees and lessees during the categorization process and by analysis of baseline vegetation inventory data, BLM personnel have identified problems associated with livestock grazing in the planning area. Opportunities are available for resolution of livestock grazing problems and conflicts.

"I" category allotments generally show the greatest need for development and present the greatest opportunities to resolve both management problems and individual concerns. Problems associated with "I" category allotments are listed, and possible management opportunities or actions to resolve them are discussed. "C" and "M" category allotments are not discussed, because no conflicts have been identified or because intensive management is not warranted for a variety of reasons.

Adjustments would not be made until monitoring verified the conflict and determined its extent. Data gathered by monitoring and through additional consultation and coordination with affected parties would support management decisions related to livestock and wildlife stocking levels and other adjustments.

Problems, Conflicts and Opportunities in the Planning Area

Problems in grazing management in the planning area are identified in table G-3, which also indicates possible solutions.

PROPOSALS FOR LIVESTOCK GRAZING MANAGEMENT BY ALTERNATIVE

Table G-4 lists allotment-specific proposals for range methods and treatments under each alternative.

Table G-5 shows the proposed stocking level for each allotment under each alternative.

PROCEDURES FOR RANGE IMPROVEMENT PROJECTS

Procedures and Regulations

The following is a discussion on the standard operating procedures and regulations that govern

TABLE G-1

LIVESTOCK GRAZING ALLOTMENT INFORMATION

Allotment Number	Allotment Name[1]	Management Category	Total Federal Acres	Forage Condition (acreage)			Season of Use[2]	Grazing Preference by Livestock Class (in AUMs)			Grazing Preference (AUMs)	Held in Suspension (AUMs)
				Satis-factory	Unsatis-factory	Undeter-mined		Cattle	Sheep	Horse		
SECTION 3 PERMITS												
0632	Dick Creek	M	175			175	S,F	25			25	
0666	Reclamation	M	6,640	2,830	3,810		Sp	293	462		755	164
0677	104	M	1,960			1,960	Sp		124		124	51
1001	Table Mountain	C	16,728			16,728	Sp,W		1,044		1,044	
1002	Whistle Creek (WH)	I	25,000	5,844	19,156		Sp,F,W		718		718	
1003	Stateline	M	19,397			19,397	S,F,W		1,143		1,143	
1004	Airport	C	840	41	799		Sp	45			45	
1005	Gravel Crossing	M	2,240			2,240	Sp	137			137	
1006	Sand Draw	I	37,188	16,967	20,221		Sp,F,W	700	1,695		2,395	720
1007	Little Dry Creek	I	50,005	25,336	24,669		Sp,F		3,504		3,504	328
1008	Gyp Creek	M	7,485	805	6,680		Sp	251			251	
1010	Little Mountain	C	389	73	316		S	16			16	
1012	West River	M	6,441	2,929	3,512		Sp,F		472		472	203
1013	Bear Creek	I	20,883	10,711	10,172		Sp,F,W		1,477		1,477	659
1014	Sheep Mountain	I	12,621	1,472	11,149		Sp,F,W		664		664	296
1015	Lower Bear Creek	I	13,701	2,453	11,248		Sp,F,W		1,194		1,194	747
1016	Home Place	C	325	216	109		Sp		21		21	28
1017	Beaver Creek	M	1,682	828	854		Sp,F		128		128	80
1018	Individual	I	6,850	3,412	3,438		Sp,F		395		395	384
1019	North Beaver	C	376	40	336		S		18		18	18
1020	McKinnie Reservoir	C	1,726			1,726	Sp		110		110	246
1023	Crystal Creek	I	15,432	4,786	10,646		Sp,F	889			889	1,516
1024	Many Springs	M	1,331	422	909		F	67			67	108
1025	Mills	I	5,106	1,048	4,058		Sp,F,W	175			175	383
1026	Burnham	M	2,139	1,508	631		Sp,F	190			190	246
1027	Moss Ranch	I	14,272	10,211	4,061		Sp,F	1,467			1,467	4,385
1028	Little Mountain	I	37,110	13,951	23,159		Y	1,905		37	1,942	3,013
1029	Moncur	C	2,360	1,745	615		Sp	129			129	108
1031	Himes Group	I	19,440	5,234	14,206		Sp,F	524			524	1,300
1032	Lovell Group	C	11,018	4,258	6,760		Sp	343			343	1,071
1033	One-forty	M	1,745	225	1,520		S,F	145			145	7
1034	Willow Creek	M	2,136	651	1,485		F	192			192	133
1035	North Shoshone	M	3,760	272	3,488		Sp	145			145	151
1036	North Shoshone	I	14,573	2,338	12,235		F,W	461			461	706
1037	Himes Spence	M	17,280			17,280	F,W	908			908	292
1038	Firing Range	M	7,070	3,414	3,656		Sp,F	308			308	292
1039	Foster Gulch	I	38,874	12,324	26,550		W	2,325			2,325	1,316
1040	Blue Wash	M	2,365	140	2,225		Sp	82			82	3
1041	Sand Hills	I	7,375	1,817	5,558		F,W		531		531	91
1042	Blue Wash	M	3,510	471	3,039		S,F		132		132	19
1043	Sand Hills	M	7,904	1,840	6,064		W	408			408	
1044	Individual	C	1,149			1,149	Sp		66		66	90
1046	Bench Canal	M	739	427	312		Sp	47			47	111
1047	County Line	M	651	644	7		S	41			41	7
1048	Dry Creek	M	720	487	233		Sp,S	64			64	86
1049	Individual	I	1,289	1,027	262		Sp	101			101	237
1050	Lovell Group 5	C	2,338	492	1,846		Sp	156			156	
1051	Greybull Group	M	11,283			11,283	Sp,S	559			559	303
1052	South Lovell Group	M	4,275	1,090	3,185		Sp	279			279	218
1053	Little Sheep Mountain	I	9,293	4,221	5,072		Sp,F	552	201		753	178
1054	Sand Hills	M	6,392	5,369	1,023		Y	562		18	580	
1055	Sidon Canal	M	1,054	858	196		Sp	46			46	105
1056	Kane	M	8,675	4,346	4,329		Sp	181			181	282
1057	Polecat-Frannie	C	1,586			1,586	Sp,S,F	155			155	
1058	Black Draw	C	811	305	506		Sp	39			39	36
1059	Thumper	I	29,639	11,864	17,775		Sp,F,W		2,159		2,159	1,439
1060	East-West (WH)	I	56,849	16,531	40,318		Sp,F,W	909	2,976		3,885	1,431
1061	Individual	C	4,842	1,003	3,839		Sp,S	200			200	
1062	Dry Creek	M	3,974			3,974	S,F		319		319	241
1064	Peaks	I	14,855	4,875	9,980		S,F	657			657	1,343
1065	YU Bench	C	170			170	S,F	13		5	18	
1066	Corbett Dam	M	3,574			3,574	Sp,S,F	300			300	20
1067	Fernandez	M	2,997			2,997	S,F	331			331	

TABLE G-1 (Continued)

LIVESTOCK GRAZING ALLOTMENT INFORMATION

Allotment Number	Allotment Name[1]	Management Category	Total Federal Acres	Forage Condition (acreage)			Season of Use[2]	Grazing Preference by Livestock Class (in AUMs)			Grazing Preference (AUMs)	Held in Suspension (AUMs)
				Satisfactory	Unsatisfactory	Undetermined		Cattle	Sheep	Horse		
SECTION 3 PERMITS (continued)												
1068	Boundary Well	M	1,060	765	295		F	169			169	91
1069	Peaks	I	10,008	1,976	8,032		F,W	1,539			1,539	358
1072	Sorensen	M	572			572	S,F	71			71	34
1073	Sage Creek Group	I	11,744	7,009	4,735		S,F	1,411			1,411	
1074	Keystone	C	94			94	Sp	27			27	31
1075	Clarksfork	I	11,200	223	10,977		Sp,F,W	1,089			1,089	
1076	Clark	C	548			548	Sp	47			47	
1078	Individual	C	100			100	Sp	8			8	1
1079	River	C	82			82	S	15			15	
1080	Two Dot	I	54,600	4,459	34,913	15,228	Sp,F,W	4,463			4,463	
1081	Individual	C	57			57	Sp	17			17	
1082	Bennett Creek	M	406			406	Sp	33			33	6
1083	Hill	M	548			548	F	225			225	
1084	Three M	C	197	181	16		F,W	11			11	49
1085	Individual	C	10			10	S	10			10	
1086	Schlaf/Common	M	4,775	1,880	2,895		Sp,F		309		309	
1501	Cedar Creek	I	1,800	1,494	306		Sp,F	200			200	226
1505	Clay Pits	I	5,401	816	4,585		Sp		237		237	295
1506	Beaver Creek	I	360		360		Sp		4		4	
1509	Red Canyon	I	5,635	3,873	1,762		Sp	192			192	155
1516	Sunlight	I	4,506	698	3,808		Sp	325			325	
1522	West of Ranch	I	1,190	857	333		F	92			92	95
1528	East Beaver	I	760	220	540		Sp		25		25	11
1529	West Beaver	I	625		625		Sp		21		21	15
1532	Lost	I	5,230	498	4,732		Sp,F,W		482		482	411
1533	Crandall	M	400	94	306		Sp		12		12	
1534	One-Twenty-One	I	3,715	990	2,725		Sp	189			189	187
1538	North Shell Group	M	18,240	1,541	16,699		Sp	1,008		53	1,061	741
1540	One-Eighth Acre	C	1			1	Sp			1	1	
1541	Red	I	720	449	271		Sp	64			64	61
Section 3 Permits subtotal			**759,191**	**222,169**	**435,137**	**101,885**		**28,527**	**20,643**	**114**	**49,284**	**27,958**
SECTION 15 LEASES												
2502	Armstrong	C	361			361	S	42			42	
2504	Carter Mountain	I	5,859		5,859		S		804		804	
2511		M	566			566	F,W	127			127	
2519	Newell Springs	M	1,320			1,320	S,F	156			156	
2523		M	1,191			1,191	W		144		144	
2524	Jack Creek	M	409			409	S	35		5	40	
2528	Mountain Meadows	M	696			696	S	140			140	
2532	Pitchfork	M	6,056			6,056	F,W	1,245			1,245	
2535	Wood River	M	40			40	Sp	8			8	
2544	Tonopah Ridge	M	3,026			3,026	S,F,W	408			408	
2545	91 Rand	M	8,758			8,758	Y	1,632			1,632	
2551		M	3,778			3,778	Sp,S	820			820	
2553	Winniger	M	1,749			1,749	Sp,S,F	317			317	
2561	Little Dry Creek	M	7,754			7,754	Sp,S,F	1,059			1,059	
3001	Bennett Creek	M	3,382			3,382	Sp,S,F	235			235	
3002	Stonewall Creek	M	40			40	S	8			8	
3003	Lower Slope	M	3,426			3,426	Sp,F	308		18	326	
3004	Stonebridge Reservoir	I	4,436	965	3,471		Sp,S,F	579			579	
3005	Natural Corral	C	193			193	S,F	39			39	
3006	Coal Creek	M	2,192			2,192	Sp,S,F	185			185	
3007	Bennett Creek	M	3,921			3,921	Sp,S,F	318		14	332	
3008	Sage Creek Addition	I	140	35	105		S,F	18			18	
3009	Keystone	M	547			547	S	32			32	
3010	Osborne	M	933			933	S	94			94	
3011	Heart Mountain	M	8,131			8,131	Sp,S,F	1,040			1,040	
3012	Question Creek	I	960		960		Sp,S,F	134			134	
3013	Billy Goat	C	260			260	S	20		11	31	
3014	Buchanan	C	278			278	S	13			13	

TABLE G-1 (Continued)

LIVESTOCK GRAZING ALLOTMENT INFORMATION

Allotment Number	Allotment Name[1]	Management Category	Total Federal Acres	Forage Condition (acreage)			Season of Use[2]	Grazing Preference by Livestock Class (in AUMs)			Grazing Preference (AUMs)	Held in Suspension (AUMs)
				Satis-factory	Unsatis-factory	Undeter-mined		Cattle	Sheep	Horse		
SECTION 15 LEASES (Continued)												
3015	Dunn Creek	C	25			25	F			3	3	
3017	Eagle Valley	C	40			40	S			4	4	
3018	Ishawooa Station	C	44			44	S	5			5	
3019	TE Ranch	C	148			148	S,F	21			21	
3020	Post Creek	C	453			453	Sp,S	20		23	43	
3021	Spirit Basin	C	480			480	Sp,S	68			68	
3022	Fernandez	M	1,079			1,079	S,F	202			202	
3023	Diamond Creek	M	457			457	S	42			42	
3024	Four Bear	C	609			609	S,F	56			56	
3025	Jim Creek	C	833			833	Sp,S			60	60	
3026	Cedar Mountain	C	886			886	Sp,S	37			37	
3027	Bunn	C	968			968	Sp,S	120			120	
3028	Close Pasture	C	1,702			1,702	S	230			230	
3029	Oregon Basin	I	9,483	7,654	1,829		S,F	2,290	199		2,489	
3030	Diamond Basin	C	641			641	Sp,S,F	70			70	
3032	River Pasture	C	274			274	W	15			15	
3033	Hogg	C	760			760	Y	80			80	
3034	Devils Tooth	C	143			143	S,F			14	14	
3035	Eagle Pass	I	25,581	350	25,231		Sp,S,F	2,825			2,825	
3036	Lakeshore	C	863			863	Sp,S,F	16		20	36	
3037	River	C	40			40	S,F	4			4	
3038	New Highway	M	210			210	S,F			35	35	
3040	Lakeview	M	178			178	S	28			28	
3041	Twin Creek	C	154			154	Sp,S,F			13	13	
3042	River Pastures	C	169			169	Sp	35			35	
3043	Diamond Bar Ranch	M	1,563			1,563	Y	198			198	
3044	Sheep Mountain	M	1,464			1,464	S	150			150	
3045	Greenwald	C	427			427	Sp	38			38	
3046	Wall Creek	C	193			193	S	20			20	
3047	Timber Creek	I	730	329	401		S	72			72	
3048	Hoodoo	M	7,007			7,007	Y	591			591	
3049	Haffey Place	C	440			440	S,F	67		3	70	
3050	Bull Creek	C	74			74	S	14			14	
3051	Cottonwood Creek	M	1,301	757	544		Sp	236			236	
3052	Desert	M	31,884			31,884	Sp,F,W	4,038			4,038	
3053	Trail Creek	I	20,228	4,576	15,652		Y	3,248			3,248	
3054	Dorrance	C	110			110	S,F	20			20	
3055	Red Pole	M	1,249			1,249	F,W			44	44	
3056	Upton	C	80			80	Sp	8			8	
3057	Ishawooa	M	23			23	S			2	2	
3058	Rand Creek	M	159			159	S	20			20	
3059	Indian Pass	I	2,252	1,001	1,251		Sp,S	206			206	
3060	Hidden Valley	M	1,743			1,743	S,F	10		140	150	
3062	Upper Sage Pasture	C	333			333	F,W	20			20	
3063	EL	M	80			80	Sp	7			7	
3064	Lower Sage Creek	M	3,755			3,755	F,W,Sp	365			365	
3065	Canyon Entrance	M	141			141	Sp	11			11	
3066	Little Rock Ck.No. 1	M	618			618	S	49			49	
3067	Red Point (WH)	I	13,999	6,629	7,370		Y	903	652		1,555	
3068	Oregon Coulee	I	4,436	2,094	2,342		F,W	851			851	
3069	Lower YU Bench	I	4,350		4,350		S,F	396			396	
3070	Rivers Rest	M	287			287	S,F			43	43	
3071	Wiley Rim	M	1,122			1,122	S,F,W	211			211	
3072	Red Creek	M	298			298	Sp	20			20	
3073	Rimrock	M	2,916	2,833	83		Sp,S	605			605	
3074	Alexander	M	372			372	Sp	63			63	
3075	Hardpan Creek	M	197			197	S			30	30	
3076	LL Bar	M	1,034			1,034	S	168			168	
3078	Lake Creek	I	428	398	30		Sp,S,F	40			40	
3079	Red Cabin	M	5,442			5,442	Sp,S,F	864			864	
3080	Sleeper	C	73			73	Y	95			95	
3081	Sorensen	M	429			429	Sp,S,F	60			60	
3082	Castle Rock	M	674			674	S,F			40	40	

TABLE G-1 (Continued)

LIVESTOCK GRAZING ALLOTMENT INFORMATION

Allotment Number	Allotment Name[1]	Management Category	Total Federal Acres	Forage Condition (acreage)			Season of Use[2]	Grazing Preference by Livestock Class (in AUMs)			Grazing Preference (AUMs)	Held in Suspension (AUMs)
				Satis-factory	Unsatis-factory	Undeter-mined		Cattle	Sheep	Horse		
SECTION 15 LEASES (Continued)												
3083	Clarksfork Canyon	I	375	138	237		S,F	28		12	40	
3084	Big Dipper	M	1,709			1,709	Sp,S	65		44	109	
3085	Sulphur Creek	C	48			48	Sp			8	8	
3086	Two Dot	M	25,430			25,430	Sp	2,696			2,696	
3087	State	M	4,023			4,023	Y	145		84	229	
3088	Reclamation (WH)	M	2,696	1,550	1,146		Sp		275		275	
3089	Newmeyer Creek	M	1,219			1,219	S,F,W			89	89	
3090	Palette	C	1,377			1,377	S,F	344			344	
3091	YU Bench	I	21,883	17,579	4,304		Y	2,283		14	2,297	
3092	Peterson	M	282			282	Sp	26			26	
3093	Mountain Slope	M	1,730			1,730	S,F	215			215	
3094	Dry Creek	M	2,389			2,389	F		300		300	
3095	Marlow Basin	M	732			732	Sp,S,F	177			177	
3096	Meeteetse Rim	M	500			500	Sp,S,F	83			83	
3097	Isolated 40	M	40			40	W	4			4	
3098	Headquarters Pasture	C	22			22	W	3			3	
3099	Ridge Pasture	C	135			135	S	19			19	
3100	Big Bend Pasture	C	462			462	S	65			65	
3101	Meadow	C	56			56	F	8			8	
3102	Bench	I	9,395	1,586	7,809		Sp,S,F	1,182			1,182	
3104	Lone Tree	I	1,615		1,615		S	259			259	
3105	Pasture No. 4	C	17			17	F	2			2	
3106	Trout Creek	M	2,141			2,141	S,F,W	120		14	134	
3107	Highway Trans	M	843			843	Sp,S,F	77			77	
3108	Rattlesnake	M	2,506			2,506	Sp,S	209			209	
3109	Southfork	C	16			16	S			1	1	
3110	Boundary Well	M	542	409	133		F	91			91	
3111	Canyon Pasture	M	3,058			3,058	W	254			254	
3112	Stone Barn 15	I	8,284	1,847	6,437		W	1,254			1,254	
Section 15 Leases subtotal			**322,058**	**50,730**	**91,159**	**180,169**		**38,449**	**2,374**	**788**	**41,611**	**0**
TOTAL FOR PLANNING AREA			**1,081,249**	**272,899**	**526,296**	**282,054**		**66,976**	**23,017**	**902**	**90,895**	**27,958**

[1] (WH) by an allotment name indicates that the allotment is inside a wild horse range. Allotments 2511, 2523, and 2551 are not named.

[2] The following are abbreviations for season of use: Sp = spring grazing, S = summer grazing, F = fall grazing, W = winter grazing, and Y = grazing allowed in any season.

TABLE G-2

SUMMARY OF RANGE CONDITION BY ALLOTMENT[1]

Allotment Number	Range Condition as Percentage of Allotment				
	Poor	Fair	Good	Excellent	Unsuitable[2]
0666	41	37	17	0	5
1002	38	22	1	0	39
1004	94	5	0	0	1
1006	45	34	11	less than 1	10
1007	36	31	20	1	12
1008	58	15	2	2	23
1010	10	2	7	10	71
1012	37	15	34	0	14
1013	40	25	19	8	8
1014	59	4	7	1	29
1015	59	20	6	1	14
1016	25	0	38	28	9
1017	31	11	34	6	18
1018	33	20	23	10	14
1019	77	8	1	0	14
1023	45	13	19	less than 1	23
1024	63	5	26	0	6
1025	78	14	6	0	2
1026	23	42	25	2	8
1027	14	22	51	8	5
1028	22	35	15	10	18
1029	6	18	15	41	20
1031	47	22	8	0	23
1032	43	17	13	6	21
1033	73	14	7	6	less than 1
1034	63	0	2	0	35
1035	65	11	less than 1	0	24
1036	60	14	2	less than 1	24
1037	36	11	14	less than 1	39
1038	40	20	30	less than 1	10
1039	56	19	9	5	11
1040	71	8	0	0	21
1041	62	7	20	1	10
1042	46	26	3	0	25
1043	42	13	16	4	25
1046	0	94	6	0	0
1047	0	48	42	9	1
1048	0	32	68	0	0
1049	0	96	3	0	1
1050	52	19	8	4	17
1052	47	23	15	0	15
1053	38	48	3	0	11
1054	less than 1	21	54	17	8
1055	0	6	15	65	14
1056	38	22	10	13	17
1058	40	41	17	0	2
1059	42	35	6	1	16
1060	44	28	2	less than 1	25
1061	14	45	8	0	33
1064	20	28	5	0	47
1068	19	31	41	0	9
1069	69	12	12	0	7
1073	19	47	13	0	21
1075	90	5	0	0	5
1080[3]	47	8	2	2	41
1084	0	8	92	0	less than 1

TABLE G-2 (Continued)

SUMMARY OF RANGE CONDITION BY ALLOTMENT[1]

Allotment Number	Range Condition as Percentage of Allotment				
	Poor	Fair	Good	Excellent	Unsuitable[2]
1086	4	60	35	1	less than 1
1501	17	26	26	31	less than 1
1505	64	17	less than 1	0	19
1506	77	0	0	0	23
1509	28	33	29	7	3
1516	83	14	1	0	2
1522	28	33	18	21	less than 1
1528	68	29	0	0	3
1529	39	less than 1	0	0	61
1532	66	8	3	0	23
1533	51	41	5	0	3
1534	73	9	17	1	0
1538	52	13	2	0	33
1541	38	12	48	2	0
2504[4]	91	0	0	0	9
3004	74	15	6	1	4
3008[5]	70	25	0	0	5
3012	100	0	0	0	less than 1
3029	16	64	17	less than 1	3
3035	95	1	1	0	3
3047	17	45	0	0	38
3051	38	58	0	0	4
3053	61	15	7	0	17
3059	39	33	16	0	12
3067	49	26	2	19	4
3068	35	45	2	0	18
3069	89	0	0	0	11
3073	0	0	97	0	3
3078	0	22	71	0	7
3083	5	52	37	0	6
3088	24	57	11	0	8
3091	16	46	32	2	4
3102	78	6	0	10	6
3104	99	0	0	0	1
3110	23	59	16	0	2
3112	72	3	21	0	4
Planning area total inventoried (acreage)					
	371,477	187,235	92,486	22,064	141,161

TOTAL = 814,423

[1] Includes allotments for which ecological site inventory has been conducted.

[2] Unsuitable for grazing use, such as rock outcrop, woodland, disturbed.

[3] Includes 15,228 acres not inventoried in time for this analysis; this acreage is displayed in the "unsuitable" column.

[4] Allotment is composed of alpine tundra which available SCS technical guides analyze inadequately.

[5] Small allotment (140 acres) encompassed by a large colony of black-tailed prairie dogs.

TABLE G-3

PROBLEMS, CONFLICTS AND OPPORTUNITIES IN LIVESTOCK GRAZING MANAGEMENT

Types of problems and conflicts that can occur in livestock grazing management are listed in Part One of this table by number. Management opportunities for actions to improve management and resolve conflicts also are listed by number.

Part Two of this table is an allotment-specific listing of livestock grazing problems and conflicts in the planning area and the management opportunities to alleviate those conflicts in each allotment.

Part One

Types of Problems and Conflicts	Management Opportunities
1. Existing water sources are insufficient to allow uniform distribution in the allotment as a whole or are unreliable. Some areas are being overutilized near existing water; other portions of the allotment are not providing the number of AUMs authorized.	1. Improve livestock distribution by developing additional water projects and/or salting. Implement grazing management systems that would alter traditional grazing patterns. Adjust the existing stocking levels to reflect actual production levels and accessible units. On the basis of season of use and vegetative types, specify the appropriate class or or kind of livestock that will best utilize the allotment.
2. The boundary of the allotment is not fenced or secured by natural boundaries that will control authorized livestock. Livestock occasionally drift into or out of the authorized allotment, resulting in trespass situations.	2. Control livestock use by constructing boundary fences or additional cross-fences.
3. Certain portions of the riparian habitat in one or more of the following areas are in an unsatisfactory condition: Riparian Zones in "I" Category Allotments a. Bear Creek b. Big Sand Coulee c. Cedar Creek d. Cottonwood Creek e. Crystal Creek f. Deer Creek g. Dry Creek h. Little Sand Coulee i. Horse Creek j. Slack Creek k. Little Rose l. Oregon Coulee m. Post Creek n. Rawhide Creek o. Rose Creek p. South ForK Dry Creek q. Sulphur Creek r. Sunlight Gulch	3. Improve riparian habitat conditions by installing protective fencing or developing range improvement projects to provide off-site waters.
4. Existing preference exceeds the current production capabilities of the vegetation communities involved.	4. Monitor actual livestock utilization in relation to actual numbers to determine proper carrying carrying capacity.

TABLE G-3 (Continued)

PROBLEMS, CONFLICTS AND OPPORTUNITIES IN LIVESTOCK GRAZING MANAGEMENT

Part One

Types of Problems and Conflicts	Management Opportunities
5. Occupation of this allotment by wildlife during traditional livestock grazing periods has resulted in dietary overlaps and forage competition in one or more of the following: a. Pronghorn b. Mule deer c. Elk d. Bighorn sheep e. Moose f. Spring, summer conflict g. Winter, fall conflict h. Insufficient grasses i. Insufficient forbs j. Insufficient shrubs	5. Monitor actual numbers of both livestock and wildlife during critical periods to determine appropriate or acceptable levels. Actions may then be necessary to redistribute large concentrations of animals.
6. The existing AMP is no longer meeting the management objectives set forth for this allotment.	6. Revise existing AMP to meet the operator's needs to develop a system that will enhance livestock grazing use and other resource values.
7. Certain portions of this allotment have excessive sagebrush canopy, which reduces the amount of desirable forage available for both wildlife and livestock.	7. Improve forage quality through the implementation of various vegetative manipulations such as prescribed burning or ripping and reseeding (vegetative manipulations are described in this appendix).
8. Excessive soil erosion is occurring on certain portions of the allotment because of a lack of vegetative cover.	8. Improve soil stability on highly erosive soils by constructing improvement projects designed to provide watershed stability.
9. Continuous early spring grazing is resulting in stress to desirable forage species that require rest or regrowth opportunities during this critical growing period.	9. Limit the number of livestock on the allotment during the critical spring season to a level that will provide appropriate utilization objectives. These objectives will be developed in consultation and coordination with the affected permittee to meet the needs of both the operator and the affected resource.
10. Trailing requirements through this allotment have resulted in overutilization of route areas and the mixing of existing livestock.	10. Trailing will be authorized on existing stock trails consistent with the overall objectives set forth for the allotments affected.
11. Plant and animal pests have posed a problem to the livestock and vegetative productivity of the allotment.	11. Act in cooperation with other affected landowners and agencies to control concentrations of noxious weeds or pests.
12. Recreational activities by the public are resulting in gates being left open. This causes livestock to drift in and out of authorized areas.	12. Install cattle guards in various trouble locations to minimize the probability of livestock drifting.

TABLE G-3 (Continued)

PROBLEMS, CONFLICTS AND OPPORTUNITIES IN LIVESTOCK GRAZING MANAGEMENT

Part One

Types of Problems and Conflicts	Management Opportunities
13. Some of the vegetative sites in the allotment are producing well below the potential in both quality and quantity levels. Changes in grazing management alone will not constitute a response.	13. Restore productivity of these sites through the implementation of various mechanical treatments.
14. The placement of supplemental feed on and around public lands has resulted in locally depleted range conditions.	14. Through consultation, and coordination with the affected permittee, develop a system of rotating the feed locations throughout the allotment. Options also may exist to place the required supplement material on private lands within the allotment, if fenced.
15. There is stress on the available vegetative resources of the area from the present wild horse population and the existing livestock grazing preference.	15. Monitor forage utilization by both wild horses and livestock to determine acceptable levels of both species. Supplement data with aerial reconnaissance of the wild horse herd areas to develop distribution patterns of the wild horse population.
16. Bentonite exploration and mining is resulting in conflicts with existing livestock grazing.	16. In coordination with the Wyoming DEQ increase abandonment compliance requirements to ensure that adequate reclamation is accomplished. Adjust livestock numbers to reflect available forage after mining claim abandonment.
17. Periodic ORV use within the allotment is resulting in accelerated erosion on areas with fragile soils.	17. Restrict ORV use to existing roads and trails in the affected areas.

Part Two

Allotment Number	Resource Conflict/Problem	Management Opportunities
1002	1,2,5a,5f,5i,13,15	1,5,7,15
1006	4,5a,5b,5f,5i,8	4,5,8
1007	4,8,13	4,8,13
1013	3a,3e,5c,5g,5i	3,5
1014	1,3a,4,5b,5g,5i,13	1,3,4,5,13
1015	3a,4,5a,5b,5f,5g,5h,5i,16	3,4,5,16
1018	1,5c,5b,5g,5i,11-coyote	1,5,11
1023	2,3e,4,5a,5b,5c,5g,5h,13	2,3,4,5,13
1027	5b,5c,5d,5g,5h	5
1028	2,3d	2,3
1031	3e	3
1036	1,2,16	1,2,16
1039	2,4,5a,5b,5g,5h,5i	2,4,5

TABLE G-3 (Continued)

PROBLEMS, CONFLICTS AND OPPORTUNITIES IN LIVESTOCK GRAZING MANAGEMENT

Part Two

Allotment Number	Resource Conflict/Problem	Management Opportunities
1041	8	8
1049	5a,5b,5f,5h,5i,5b,5g,5h,5i,7,9	5,7,9
1053	8	8
1059	1,3g,4,5a,5b,5f,5g,5h,5i,5j	1,3,4,5
1060	2,3g,4,5a,5b,5f,5g,5h,5i,9,11-coyote,12	2,3,4,5,9,11,12
1064	3f,4	3,4
1069	4,14	4,14
1073	4,6,11-prairie dogs	4,6,11
1075	3b,4,5a,5b,5f,5g,5h,5i,9	3,4,5,9
1079	13	4
1080	3h,5a,5b,5f,5g,5h,5i,5j,6,8	3,5,6,8
1505	4,5b,5f,5g,5h,5i,16	4,5,16
1506	5b,5g,5h,5i	5
1509	3c,5b,5c,5g,5h,5i,5j	3,5
1516	3q,4,5b,5f,5h,5i,5b,5c,5g,5h,,5i,8,9	3,4,5,8,9
1522	3h,5b,5g,5h,5i,5j	3,5
1528	5b,5g,5h,5i	5
1529	4,5b,5f,5h,5i,5b,5g,5h,5i,5j	4,5
1534	5b,5c,5g,5h,7,8,9	5,7,8,9
1541	5b,5c,5g,5h,5i,5j	5
2504	3m,3n,3j,5a,5b,5c,5d,5e,5g,5h,5i,17	3,5,17
3004	3l,3i,5a,5b,5c,5d,5g,5h,7	3,5,7
3008	4,5a,5b,5f,5g,5h,5i,5j,11-prairie dogs	4,5,11
3012	4,5a,5b,5f,5g,5h,5i,10	4,5,10
3029	3o,4,5a,5b,5g,5h,5i,5j,5a,5b,5f,5h,5i,7,12	3,4,5,7,12
3035	1,3k,3o,4,5a,5b,5f,5h,5i,5a,5b,5g,5h,5i,5j,8,13	1,3,4,5,8,13
3047	5a,5d,5f,5h,5a,5b,5c,5g,5h,5j	5
3051	3d,4	3d,4
3053	4,5a,5b,5c,5d,5e,5f,5h,5b,5c,5d,5e,5g,5h,5i,5j,6,7,12	4,5,6,7,12
3059	3p,4,5b,5f,5g,5h,5i,16	3,4,5,16
3067	3g,4,5a,5b,5f,5g,5i,9,11-coyote,12,15	3,4,5,9,11,12,15
3068	3k,3g,4,5a,5b,5g,5h,5i,5j,8,12	3,4,5,8,12
3069	4,5a,5b,5f,5g,5h,5i,5j,7,12	4,5,7,12
3091	3o,4,5a,5b,5f,5g,5h,5i,10,12	3,4,5,10,12
3102	3g,4,5a,5b,5f,5g,5h,5i,7,9,10	3,4,5,7,9,10
3104	1,4,5a,5b,5f,5h,5i,5a,5b,5g,5h,5i,5j,8	1,4,5,8
3112	4,5a,5b,5g,5h,5i,8	4,5,8

TABLE G-4

PROPOSED RANGE METHODS AND TREATMENTS BY ALLOTMENT

Allot. Number	Grazing Systems		Vegetation Manipulations						Structural Projects					
	Spring Defer	Rest-Rotate	Burn	Burn & Reseed	Chemical	Inter-seed	Rip & seed	Contour Furrow	Reservoirs	Fencing Div.	Fencing Boundary	Springs	Pipelines	Wells
ALTERNATIVE A														
	BLM funded projects would be limited to areas covered by an existing AMP.													
1002	Approximately 2.5 miles of boundary fence would be constructed on the north end of the allotment.													
1060	Approximately 3 miles of boundary fence would be constructed on the north end of the allotment.													
1067	No projects would be proposed.													
1073	Rest-rotation grazing systems would be implemented to provide rest during critical growing seasons.													
1080	Approximately 1,989 acres of saline upland vegetation would be ripped and seeded. Contour furrowing would be done on about 540 acres.													
3035	Approximately 3.5 miles of pipeline would be const ructed for water distribution.													
3052	No projects would be proposed.													
3053	About 765 acres of sagebrush would be burned.													
ALTERNATIVE B														
1002					X		X	X	X		X			
1006					X	X		X						X
1007					X			X	X					
1013			X		X			X					X	X
1014								X	X					
1015			X											X
1018			X	X					X					
1023						X		X		X	X		X	X
1027			X		X									
1028			X		X							X	X	
1031								X	X					
1036								X	X	X				
1039			X					X						
1041								X	X					
1049	X		X											
1053	X		X		X				X					
1059					X			X	X					
1060	X		X		X			X	X	X				
1064					X		X							
1069					X			X						
1073		X												
1075	X				X		X	X						
1080					X	X	X	X					X	X
1505					X			X						
1506								X						
1509			X		X			X	X					
1516	X		X	X	X				X					
1522					X			X	X					
1528			X		X			X						
1529		X												
1534	X		X	X	X									

TABLE G-4 (Continued)

PROPOSED RANGE METHODS AND TREATMENTS BY ALLOTMENT

Allot. Number	Grazing Systems		Vegetation Manipulations						Structural Projects					
	Spring Defer	Rest-Rotate	Burn	Burn & Reseed	Chemical	Inter-seed	Rip & seed	Contour Furrow	Reservoirs	Fencing Div.	Fencing Boundary	Springs	Pipelines	Wells
ALTERNATIVE B (Continued)														
2504												X	X	
3004					X				X					
3008					X									
3012						X			X					
3029			X		X				X					
3035						X	X	X					X	
3047			X		X									
3053			X		X									
3059			X			X		X						
3067	X		X		X		X	X	X					
3068					X		X	X	X					
3069			X			X	X							
3091			X		X		X	X					X	X
3102	X				X		X	X	X					
3104						X	X		X					
3112					X		X	X					X	
Total acreage Alternative B														
8	**3**		**19,334**	**1,078**	**40,482**	**7,854**	**24,224**	**101,540**	**20**	**3**	**2**	**2**	**8**	**6**
ALTERNATIVE C														
1002						X			X					
1006						X								X
1007									X					
1013			X										X	X
1014									X					
1015			X											X
1018			X						X					
1023						X				X	X		X	X
1027			X											
1028			X									X	X	
1031			X						X					
1036									X	X				
1039			X											
1041						X			X					
1049	X		X											
1053	X		X						X					
1059									X					
1060	X		X						X	X				
1064														
1069														
1073		X												
1075	X													
1080						X						X	X	
1505														

TABLE G-4 (Continued)

PROPOSED RANGE METHODS AND TREATMENTS BY ALLOTMENT

Allot. Number	Grazing Systems		Vegetation Manipulations						Structural Projects					
										Fencing				
	Spring Defer	Rest-Rotate	Burn	Burn & Reseed	Chemical	Inter-seed	Rip & seed	Contour Furrow	Reservoirs	Div.	Boundary	Springs	Pipelines	Wells
ALTERNATIVE C (Continued)														
1506														
1509			X						X					
1516	X		X						X					
1522									X					
1528			X											
1529		X												
1534	X		X	X										
2504												X	X	
3004									X					
3008														
3012						X			X					
3029			X						X					
3035						X						X		
3047														
3053			X											
3059						X								
3067	X		X						X					
3068									X					
3069			X											
3091			X										X	X
3102	X								X					
3104						X			X					
3112													X	
Total acreage Alternative C														
8	**3**	**17,039**	**0**	**0**	**5,760**	**0**	**0**	**20**	**3**	**1**	**2**	**8**	**6**	
ALTERNATIVE D														
1002			X				X		X					
1006						X						X		
1007						X	X							
1013											X	X		
1014							X							
1015			X											
1018							X							
1023									X		X	X		
1027							X							
1028		X						X	X	X	X			
1031							X	X						
1036		X					X	X	X					
1039									X					
1041						X								
1049	X		X											
1053						X	X							
1059						X	X							
1060	X						X	X						

TABLE G-4 (Continued)

PROPOSED RANGE METHODS AND TREATMENTS BY ALLOTMENT

Allot. Number	Grazing Systems: Spring Defer	Grazing Systems: Rest-Rotate	Vegetation Manipulations: Burn	Burn & Reseed	Chemical	Inter-seed	Rip & seed	Contour Furrow	Structural Projects: Reservoirs	Fencing: Div.	Fencing: Boundary	Springs	Pipelines	Wells
ALTERNATIVE D (Continued)														
1064					X					X				
1069		X												
1073		X												
1075	X				X									
1079									X					
1080					X	X					X	X		
1505				X										
1506						X								
1509							X							
1516	X					X	X							
1522							X							
1528				X										
1529		X												
1534	X		X											
1541		X												
2504										X	X			
3004			X				X							
3008				X										
3012							X							
3029			X				X							
3035		X			X						X	X		
3047				X										
3053			X											
3059						X								
3067	X													
3068					X		X							
3069			X											
3091					X						X			
3102	X		X		X	X								
3104					X		X							
3112						X					X			
Total acreage Alternative D														
7	**7**		**8,488**	**369**	**7,422**	**10,716**	**18**	**4**	**6**	**3**	**8**	**5**		

Note: This table has been divided into sections within each alternative for easier readability.

TABLE G-5

PROPOSED STOCKING RATES BY ALTERNATIVE

Allotment Number	Alternative A		Alternative B		Alternative C		Alternative D (Preferred)	
	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)
SECTION 3 PERMITS								
0632	25	25	25	25	25	25	25	25
0666	755	755	552	715	552	715	755	872
0677	25	161	124	124	115	133	124	124
1001	1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044
1002	683	656	718	822	503	1,028	656-718	907
1003	741	741	1,143	1,143	1,143	1,143	1,143	1,143
1004	45	45	45	45	45	45	45	35
1005	137	137	137	137	137	137	137	137
1006	945	2,074	2,395	2,370	960	1,930	1,578-2,395	1,689
1007	757	3,375	3,504	3,596	2,453	3,105	2,500-3,504	2,640
1008	177	255	251	251	251	251	251	241
1010	16	16	16	16	16	6	16	11
1012	472	472	472	472	472	472	472	472
1013	1,148	1,515	1,477	1,592	1,034	1,516	1,456-1,477	1,456
1014	517	718	664	679	468	763	468-664	468
1015	721	498	1,194	613	307	605	449-1194	479
1016	21	21	21	40	21	21	21	40
1017	73	128	128	147	128	128	128	147
1018	395	494	395	644	310	517	394-395	394
1019	18	18	18	23	18	18	18	23
1020	110	110	110	110	110	110	110	110
1023	571	525	889	994	318	559	619-889	619
1024	67	119	67	119	67	67	67	119
1025	175	229	175	229	175	175	175	229
1026	221	206	190	241	190	190	190	241
1027	1,434	1,931	1,467	2,198	1,027	1,383	1,466-1,467	1,466
1028	1,500	2,243	1,942	2,470	1,942	1,942	1,941-1,942	2,038
1029	129	259	129	259	129	129	129	259
1031	383	763	524	1,001	403	778	524	763
1032	343	359	343	359	343	343	343	359
1033	145	84	145	145	145	145	145	145
1034	192	192	192	192	192	192	192	114
1035	145	145	145	145	145	145	145	98
1036	277	585	461	608	323	547	402-461	422
1037	908	908	908	908	908	908	908	704
1038	154	407	308	486	308	308	308	486
1039	2,251	1,756	2,325	2,666	1,628	2,287	1,809-2,325	1,809
1040	82	82	82	82	82	82	82	68
1041	371	628	531	709	372	627	485-531	523
1042	107	158	132	132	132	132	132	90
1043	279	454	408	487	408	408	408	487
1044	66	66	66	66	66	66	66	66
1046	47	47	47	74	47	47	47	74
1047	40	40	41	78	41	41	41	78
1048	38	70	64	102	64	64	64	102
1049	81	94	101	204	71	106	100-101	161
1050	156	156	156	156	156	156	156	112
1051	131	345	559	559	131	345	559	559
1052	160	220	279	279	160	220	279	222
1053	487	1,025	753	1,230	542	970	749-753	765
1054	554	567	580	769	554	567	580	769
1055	46	46	46	154	46	46	46	154

TABLE G-5 (Continued)

PROPOSED STOCKING RATES BY ALTERNATIVE

Allotment Number	Alternative A		Alternative B		Alternative C		Alternative D (Preferred)	
	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)
SECTION 3 PERMITS (Continued)								
1056	137	163	181	432	137	163	181	432
1057	155	155	155	155	155	155	155	155
1058	39	39	39	45	39	39	39	45
1059	1,584	1,204	2,159	1,827	764	1,267	1,066-2,159	1,119
1060	3,008	2,076	3,885	3,422	1,313	2,540	2,085-3,885	2,189
1061	200	200	200	204	200	200	200	204
1062	319	319	319	319	319	319	319	319
1064	644	406	657	673	134	355	407-657	502
1065	18	18	18	18	18	18	18	18
1066	300	300	300	300	300	300	300	300
1067	331	331	331	331	331	331	331	331
1068	169	169	169	169	169	169	169	90
1069	1,539	643	1,539	1,108	397	788	643-1,539	675
1072	71	71	71	71	71	71	71	71
1073	1,123	1,550	1,411	1,411	1,123	1,495	806-1,411	846
1074	27	27	27	27	27	27	27	27
1075	876	701	1,089	772	233	554	371-1,089	446
1076	47	47	47	47	47	47	47	47
1078	8	8	8	8	8	8	8	8
1079	15	15	15	15	15	15	15	15
1080	4,463	4,018	4,463	4,734	2,633	3,761	3,000-4,463	3,175
1081	17	17	17	17	17	17	17	17
1082	7	45	33	33	33	33	33	33
1083	225	225	225	225	225	225	225	225
1084	11	11	11	18	11	11	11	18
1085	10	10	10	10	10	10	10	10
1086	309	552	309	522	309	309	309	522
1501	180	200	200	247	180	190	200	247
1505	154	127	237	248	57	172	127-237	127
1506	4	4	4	13	3	3	3-4	9
1509	158	186	192	560	134	244	191-192	191
1516	325	325	325	587	228	518	323-325	350
1522	92	92	92	167	64	84	91-92	91
1528	25	25	25	69	23	48	24-25	24
1529	21	21	21	8	0	8	8-21	8
1532	96	316	482	482	482	482	482	482
1533	2	12	12	15	12	12	12	15
1534	189	394	189	532	163	333	188-189	299
1538	1,029	987	1,061	1,061	1,029	1,061	1,061	1,061
1540	1	1	1	1	1	1	1	1
1541	51	64	64	90	45	63	63-64	66
Section 3 Permits subtotal	**38,141**	**44,001**	**49,284**	**44,705**	**32,686**	**44,219**	**38,584**	**41,368**
SECTION 15 LEASES								
2502	42	42	42	42	42	42	42	42
2504	482	926	804	780	563	1,173	778-804	778
2511	127	127	127	127	127	127	127	127
2519	156	156	156	156	156	156	156	156
2523	144	144	144	144	144	144	144	144
2524	40	40	40	40	40	40	40	40
2528	140	140	140	140	140	140	140	140

TABLE G-5 (Continued)

PROPOSED STOCKING RATES BY ALTERNATIVE

Allotment Number	Alternative A		Alternative B		Alternative C		Alternative D (Preferred)	
	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)
SECTION 15 LEASES (Continued)								
2532	1,234	1,244	1,245	1,245	1,234	1,239	1,245	1,245
2535	8	8	8	8	8	8	8	8
2544	403	412	408	408	408	408	408	408
2545	1,630	1,634	1,632	1,632	1,632	1,632	1,632	1,632
2551	820	820	820	820	820	820	820	820
2553	317	317	317	317	317	317	317	317
2561	935	1,059	1,059	1,059	935	997	1,059	1,059
3001	135	335	235	235	235	235	235	235
3002	8	8	8	8	8	8	8	8
3003	323	329	326	326	326	326	326	326
3004	635	579	579	1223	405	859	574-579	801
3005	39	39	39	39	39	39	39	39
3006	185	185	185	185	185	185	185	185
3007	332	332	332	332	332	332	332	332
3008	17	7	18	19	0	6	7-18	7
3009	32	32	32	32	32	32	32	32
3010	94	94	94	94	94	94	94	94
3011	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
3012	134	31	134	134	17	45	31-134	31
3013	31	31	31	31	31	31	31	31
3014	13	13	13	13	13	13	13	13
3015	3	3	3	3	3	3	3	3
3017	4	4	4	4	4	4	4	4
3018	5	5	5	5	5	5	5	5
3019	21	21	21	21	21	21	21	21
3020	43	43	43	43	43	43	43	43
3021	68	68	68	68	68	68	68	68
3022	202	202	202	202	202	202	202	202
3023	42	42	42	42	42	42	42	42
3024	56	56	56	56	56	56	56	56
3025	60	60	60	60	60	60	60	60
3026	37	37	37	37	37	37	37	37
3027	120	120	120	120	120	120	120	120
3028	230	230	230	230	230	230	230	230
3029	2,456	797	2,489	1,141	410	665	806-2,489	874
3030	70	70	70	70	70	70	70	70
3032	15	15	15	15	15	15	15	15
3033	80	80	80	80	80	80	80	80
3034	14	14	14	14	14	14	14	14
3035	2,825	1,102	2,825	2,882	156	1,389	1,099-2,825	1,407
3036	36	44	36	36	36	39	36	36
3037	4	4	4	4	4	4	4	4
3038	31	35	35	35	31	33	35	35
3040	28	28	28	28	28	28	28	28
3041	13	13	13	13	13	13	13	13
3042	35	35	35	35	35	35	35	35
3043	198	198	198	198	198	198	198	198
3044	150	150	150	150	150	150	150	150
3045	38	38	38	38	38	38	38	38
3046	20	20	20	20	20	20	20	20
3047	72	82	72	113	50	61	71-72	71
3048	591	591	591	591	591	591	591	591
3049	70	70	70	70	70	70	70	70

TABLE G-5 (Continued)

PROPOSED STOCKING RATES BY ALTERNATIVE

Allotment Number	Alternative A		Alternative B		Alternative C		Alternative D (Preferred)	
	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)
SECTION 15 LEASES (Continued)								
3050	14	14	14	14	14	14	14	14
3051	236	236	236	236	236	236	236	112
3052	4,038	4,038	4,038	4,038	4,038	4,038	4,038	4,038
3053	3,248	1,799	3,248	2,201	432	3,378	1,617-3,248	1,799
3054	20	20	20	20	20	20	20	20
3055	44	44	44	44	44	44	44	44
3056	8	8	8	8	8	8	8	8
3057	2	2	2	2	2	2	2	2
3058	20	20	20	20	20	20	20	20
3059	206	107	206	233	62	112	130-206	151
3060	150	150	150	150	150	150	150	150
3062	20	20	20	20	20	20	20	20
3063	7	7	7	7	7	7	7	7
3064	365	365	365	365	365	365	365	365
3065	11	11	11	11	11	11	11	11
3066	49	49	49	49	49	49	49	49
3067	1,123	1,189	1,555	2,013	1,089	1,479	1,154-1,555	1,211
3068	610	179	851	378	177	337	252-851	312
3069	394	123	396	494	22	203	171-396	372
3070	43	43	43	43	43	43	43	43
3071	210	210	211	211	211	211	211	211
3072	20	20	20	20	20	20	20	20
3073	605	302	605	605	482	482	605	373
3074	63	63	63	63	63	63	63	63
3075	30	30	30	30	30	30	30	30
3076	168	168	168	168	68	68	68	68
3078	40	37	40	40	40	40	40	37
3079	864	864	864	864	864	864	864	864
3080	95	95	95	95	95	95	95	95
3081	60	60	60	60	60	60	60	60
3082	40	40	40	40	40	40	40	40
3083	40	27	40	40	40	40	40	27
3084	109	109	109	109	109	109	109	109
3085	8	8	8	8	8	8	8	8
3086	2,696	2,696	2,696	2,696	2,696	2,696	2,696	2,629
3087	229	229	229	229	229	229	229	229
3088	275	182	275	275	275	275	275	182
3089	87	89	89	89	89	87	89	89
3090	344	344	344	344	344	344	344	344
3091	2,051	2,046	2,297	2,767	1,608	2,141	2,046-2,297	2,095
3092	21	31	26	26	26	26	26	26
3093	215	215	215	215	215	215	215	215
3094	271	329	300	300	300	300	300	300
3095	177	177	177	177	177	177	177	177
3096	83	83	83	83	83	83	83	83
3097	4	4	4	4	4	4	4	4
3098	3	3	3	3	3	3	3	3
3099	19	19	19	19	19	19	19	19
3100	65	65	65	65	65	65	65	65
3101	8	8	8	8	8	8	8	8
3102	1,056	346	1,182	916	301	665	477-1,182	689

TABLE G-5 (Continued)
PROPOSED STOCKING RATES BY ALTERNATIVE

Allotment Number	Alternative A		Alternative B		Alternative C		Alternative D (Preferred)	
	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)	Short-term (AUMs)	Long-term (AUMs)
SECTION 15 LEASES (Continued)								
3104	200	49	259	149	19	58	72-259	79
3105	2	2	2	2	2	2	2	2
3106	134	134	134	134	134	134	134	134
3107	77	77	77	77	77	77	77	77
3108	209	209	209	209	209	209	209	209
3109	1	1	1	1	1	1	1	1
3110	91	45	91	91	60	75	91	45
3111	90	254	254	254	254	254	254	254
3112	1,254	376	1,254	1,001	325	589	530-1,254	545
Section 15 Leases subtotal	**39,755**	**32,866**	**41,611**	**33,493**	**28,685**	**36,291**	**33,157**	**33,986**
PLANNNNG AREA TOTAL	**77,896**	**76,867**	**90,895**	**93,577**	**61,371**	**80,510**	**71,741**	**75,354**

the development of range improvement projects in the planning area. A number of specific design features not mentioned here also may be incorporated in the construction of such projects; for example, a requirement for a specific color of fence post to minimize the impacts associated with visual quality. These types of mitigative specifications will be incorporated individually into a required environmental assessment.

The following procedures would be followed in the construction of all management facilities and the implementation of vegetative manipulations.

To ensure the protection of other resources that could be adversely affected, an environmental assessment would be required before the development and/or approval of any range improvement project proposed on public lands .

All range improvement projects involving surface-disturbing activities would be inventoried for prehistoric and historic features to comply with the National Historic Preservation Act of 1966, 36 CFR 800, and Executive Order 11593. All sites found during such inventories would be protected, where feasible. If buried sites were discovered during construction, operations would cease until such time as BLM could evaluate the discovery and determine the appropriate actions.

The construction or development of a range improvement project would be denied if the proposal would affect or jeopardize the continued existence of federally listed threatened or endangered plant or animal species and/or its habitat. Consultation and coordination with the USFWS would be required under such conditions to determine acceptable mitigating measures to avoid possible impacts.

The development of new range improvement projects or the maintenance of existing facilities within wilderness study areas would follow the guidelines set forth in the BLM's *Interim Management Policy and Guidelines for Lands under Wilderness Review* (USDI, BLM 1979, 1983).

Specific schedules would be set for the construction of projects in critical wildlife areas such as winter ranges, fawning/calving areas, or strutting grounds to avoid possible stress of the species involved.

All actions would address the BLM's visual resource management criteria in the project planning stages for activities that would affect the existing landscape, disturb the soils, or remove vegetation. This type of analysis would determine the amount of contrast that would exist between the proposal and the landscape so that actions required to reduce the visual impacts could be determined.

Cooperative agreements or range improvement permits would be required on all projects constructed on public lands so that maintenance responsibilities for those projects could be assigned.

Benefit/cost analysis would be conducted on all projects before approval to determine if there would be a positive economic return on investment.

Structural Projects

Fences

Fencing is one of many ways of controlling wild and domestic animals to achieve resource management objectives within specific areas. It is commonly used on range and forested lands to control domestic livestock, to exclude certain livestock and wildlife species from hazard, study, or regeneration areas, and to gain uniform distribution of livestock for proper utilization of the range or for protection of human and cultural values. Fencing also has been used in the past for the protection of riparian zones for restoration purposes.

Fences would be constructed according to the specifications outlined in BLM Manual Handbook H-1741-1 for the control of livestock and for the protection and enhancement of wildlife species and their habitats. These specifications consider areas of seasonal movement by big game species, big game habitat areas, critical wildlife habitat, wild horse range, and drainage crossings for the development of standards that would minimize effects on those affected resources.

An example of certain stipulations that could be applied is a given spacing of the strands and total height of the fence that will allow ease of movement by certain wildlife species. Variances of these requirements can be exercised by the authorized officer after consultation with the affected parties.

Water Developments

General

Water developments such as springs, stock ponds, reservoirs, catchments, pipeline systems, and wells are constructed to provide water

sources for both domestic and wildlife species, to make available of areas otherwise restricted from livestock grazing because of the lack of water, and to relieve areas associated with existing watering facilities, where grazing pressures generally are heavy.

Springs

The development of a spring involves the placement of a collection system to funnel the water into a buried box structure. The box normally is made from a section of metal culvert with a cover and an outlet fitting in which a delivery pipe is connected. A pipeline delivers the water to an outside trough for use by wildlife and livestock. The spring area is commonly fenced to exclude possible damage resulting from livestock.

Catchments

Catchments are constructed with the use of an asphalt or butyl lined collection pit with an attached storage tank. Pipelines are then used to distribute the stored water source to various locations throughout an allotment or management area.

Reservoirs

Reservoir sites are selected on the basis of specific allotment management objectives and through consultation with hydrologists, engineers, range conservationists, and the affected permittees. BLM guidelines and specifications are followed in the construction of dams or earthwork type activities.

Wells

The placement of a well is based on geological reports that predict the probability of success and determine the expected depth of drilling to reaching the aquifer. All federal, state, and local regulations are observed in the development of groundwater facilities.

Pipelines

Whenever practical, pipelines are buried to a depth of approximately 12-18 inches to protect them from adverse weather conditions and surface activities. In cases where soil structures or terrain prevents this method, the pipeline is placed on the surface of the ground and made of a higher quality materials to avoid or minimize the above-mentioned hazards. Most pipelines have water tanks located every half-mile along the routes.

Vegetative Manipulations

Prescribed Burning

Prescribed burning generally is an acceptable method of reducing the amount of sagebrush that has increased to an undesirable level. It would be initiated through consultation among DEQ, WGFD, BLM, the affected landowners, and owners of adjacent property. Burning in the spring before perennial growth or in the fall after the desirable grasses have become dormant achieves the best results. Burn plans that identify specific operational procedures would be developed before burning is carried out.

Reseeding after the burn would be authorized for areas or vegetative communities not capable of natural regeneration. Seed mixtures would be prescribed on the basis of adaptability, management objectives, and surrounding vegetation of the area. Seedbed preparation normally would not be required.

Contour Furrowing

The primary objective of contour furrowing is to retain water on the land and prevent erosion through the development of an increased forage yield. The spacing and depth of the furrows vary depending on the soils, terrain, and overall objectives on the site, but furrows commonly are spaced 2 feet apart and made 4 to 8 inches deep. A seed mixture is applied to speed up the recovery rate of the natural community. Species to be seeded would be selected to meet management objectives developed for the allotment.

Interseeding

Interseeding is considered an alternative to complete seedbed preparation when erosion hazards are too high, the preparation and costs of preparing a seedbed are undesirable, or the overall objective is to modify or restore rather than to replace the existing plant stand. The primary purpose of interseeding is to reestablish native plant communities of higher successional order than the existing ones and to raise overall range condition to fair or good in a relatively short time.

Periods of rest from livestock are essential following interseeding. Closely regulated grazing may be required for several years to protect the young seedlings (which the grazing animals prefer) until stability and establishment have occurred.

Chemical Treatments

The application of chemicals for the control of noxious weeds and sagebrush would be cleared by the U. S. Department of Interior. Specific methods of applying chemicals on the ground would be used for the control of noxious weeds and the reduction of sagebrush canopies that have increased to undesirable levels. All applications of chemicals would be accomplished under the environmental constraints of the Big Horn Basin Designated Noxious Weed Treatment Program and the Northwest Area Noxious Weed Control Environmental Statement. Only four herbicide formulations will be approved for use on public lands at this time: picloram, glyphosate, 2.4-D and dicamba. Other formulations may be approved in the future if an acceptable "worst case analysis" is performed for the specific chemical. Water quality monitoring of treated areas will be established according to the criteria outlined in the Northwest Area Noxious Weed Control Program Final EIS.

Ripping and Seeding

The purpose of ripping is to break up compacted layers that are restricting root and moisture penetration. The depth of penetration depends on the depth of the restrictive layer, but it generally ranges from 10 to 36 inches. Because of the high costs associated with this method, this technique would be limited to responsive sites that will yield a high rate of return. A seed mixture would be selected on the basis of adaptability and specific allotment objectives.

RANGE MONITORING STUDIES

Purpose

The purpose of monitoring studies is to provide the data needed for making management decisions, determining the effectiveness of on-the-ground management actions, and evaluating progress toward meeting management objectives on high priority allotments.Management objectives in the planning area are (a) to gather adequate data on all "I" and "M" category allotments, (b) to determine the effects of management actions on the rangeland resources, and (c) to provide quantifiable data needed to support management decisions. All monitoring plans will follow BLM Manual 4400, Technical References 4400-1 through 4, Instruction Memo 87-236, and the Wyoming Monitoring Handbook (H-4423-1) as modified.

Methods

A formal evaluation of any allotment or management unit must examine the effects of consumptive uses in that area, such as livestock grazing, wild horses, and wildlife. A high degree of interdisciplinary coordination will ensure that multiple use principles are considered and that all interested and affected parties are involved in the development of the objectives. These objectives must be meaningful, specific, and measurable.

The monitoring studies established in specific allotments where wildlife-livestock conflicts have been identified will be designed to provide information for wildlife and range management personnel to determine actual problems or conflicts. At a minimum, information will be needed on actual use levels and forage utilization by each ungulate species involved. This will require close cooperation and specific input from the WGFD during the planning, implementation, and analysis of the monitoring studies.

Data will be collected in areas identified in the *McCullough Peaks Wild Horse Herd Area Management Plan* (USDI, BLM 1985) during winter through aerial and ground observations. Actual numbers, distribution patterns, and utilization levels specific to the wild horses will be determined to provide feasible baseline data for determining impacts.

Monitoring

Monitoring plans will include consultation, cooperation, and coordination with range users both before and during the development of allotment monitoring studies. The most important objective is to develop trust, understanding, and a sound working relationship between BLM and the users. Range users can help with the monitoring plan by collecting ground data, making observations, and providing specific operational experience that the individual range specialist may lack.

Monitoring objectives for the state of Wyoming are consistent with those identified for the BLM in BLM instruction memorandum 86-706. In general, the instruction memorandum directs that adequate data be collected on all "I" and "M" category allotments to determine the effects of management actions on rangeland resources and to provide quantifiable data needed to support man-

agement decisions. Objectives for each specific allotment will be developed in conjunction with the range user and other interested parties. These specific objectives will be included in allotment monitoring plans that will be prepared in conjunction with allotment grazing plans.

The method, amount, and intensity of monitoring established and conducted for each allotment will depend on category, resource values, and specific allotment objectives. High intensity monitoring will be implemented in allotments identified as top "I" priority. Low-intensity monitoring studies will be carried out on the remaining lower priority "I" and "M" category allotments so that significant changes in current management or resource values can be detected.

High-intensity studies provide sufficient data to support decisions that establish grazing capacities, seasons of use, and the kind and number of grazing animals by allotment. Studies at this level of monitoring are those that determine actual use and forage utilization as well as climatic studies.

Annual production data will be collected to relate forage utilization levels to an annual amount of biomass. Trend studies will be used along with annual climatic data and information on actual use and forage utilization to analyze the effectiveness of the management decisions taken to achieve specific allotment objectives.

Low-intensity studies are those that detect undesirable changes in existing range condition that could warrant re-evaluation of the priority or category for that allotment. At a minimum, such studies include an allotment inspection and the completion of form WY 4120-2 (which indicates when the allotment was inspected) and form WY 4120-3 (on which the employee records consultation with the operator, vegetation condition, kind and location of livestock, range improvements and management practices, and other information noted). This document and monitoring will be required at least every five years. Actual use data will be submitted for all "I" and "M" allotments.

APPENDIX H

BLM VISUAL RESOURCE MANAGEMENT

SCENIC QUALITY CLASSES

Scenic quality classes are defined by a system rating seven key factors: landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modification. There are three scenic quality classes.

Class A areas are areas that combine the most outstanding characteristics of each rating factor.

Class B areas are areas in which there is a combination of some outstanding features and some that are fairly common to the physiographic region.

Class C areas are areas in which the features are fairly common to the physiographic region.

MANAGEMENT CLASSES

Management classes determine the amount of modification allowed to the basic elements of the landscape. There are five classes.

Class I: Very limited management activity is allowed. Created contrasts must not attract attention. This classification applies to wilderness areas, wild and scenic rivers, etc.

Class II: Changes in any of the basic elements caused by management activity should not be evident in the characteristic landscape. Contrasts are seen but must not attract attention.

Class III: Contrasts to the basic elements caused by a management activity are evident but should remain subordinate to the existing landscape.

Class IV: Any contrast attracts attention and is a dominant feature of the landscape in terms of scale, but it should repeat the form, line, color, and texture of the characteristic landscape.

Class V: The Class V classification is applied to areas where the natural character of the landscape has been disturbed to a point where rehabilitation is needed to bring it up to one of the four other classifications. The classification also applies to areas where there is potential to increase the landscape's visual quality. It is often used as an interim classification until objectives of another class can be reached.

APPENDIX I

WATERSHED

BEST MANAGEMENT PRACTICES

Introduction

The proposed best management practices (BMP) for watershed are listed below. These proposed practices are based on the state of Wyoming's Big Horn Basin 208 and 305b plans. These recommended practices and the management prescriptions proposed in Alternative D may be certified for use by the Wyoming DEQ.

Recommendations

Sedimentation is a concern throughout the planning area. The Big Horn Basin 208 plan cited two specific drainages that showed signs of accelerated erosion problems caused largely by grazing practices. As required by the cooperative agreements between BLM and the state of Wyoming, BMPs from this plan are cited verbatim.

Recommendation 1: That the BLM conduct monitoring programs for water quality on the following watersheds:

> In the Shoshone River Subbasin, the following drainages: Whistle Creek, Deer Creek, Coon Creek, Sand Draw, Roan Wash, and Foster Gulch. In the Bighorn River Subbasin, the following drainages: Crystal Creek, Bear Creek, and Dry Bear Creek. This monitoring should be coordinated with range management activities on allotments in these designated drainages, such as the preparation of allotment management plans.

The data necessary to make assessments of sediment load in these drainages include rainfall characteristics, soil properties, slope factors, land cover conditions, and cultural or conservation practices. The data should be sufficient to satisfy appropriate models for determining proper grazing intensity. By varying the values of certain parameters, such as vegetation cover and management practices, the model can estimate sediment yields resulting from alterations in grazing use. Such evaluations should be included in the BLM's management situation analysis.

Recommendation 2: That the appropriate federal agency identify and implement suitable Best Management Practices to bring about necessary improvements in grazing practices, when sufficient evidence is available to demonstrate that rangeland and water quality, can be improved by these practices. Selected BMP's from which to choose shall include but not be limited to:

Reducing numbers of livestock
Regulating types and seasons of livestock use
Implementing grazing systems that protect vegetation
Eliminating grazing use from identified sensitive areas
Developing adequate water and salting systems
Reducing numbers of wildlife (including wild horses)
Revegetation of disturbed areas
Constructing mechanical structures
Developing cooperative watershed management plans
Controlling sagebrush and noxious weeds in selected areas with proper techniques, and
Any combination of the above.

WATER WELL CONVERSION CRITERIA

The BLM has authority for converting abandoned oil and gas wells to water wells through the Mineral Leasing Act of 1920, as amended, the Federal Land Policy and Management Act of 1976, 43 CFR 3160, 43 CFR 2300, and Onshore Oil and Gas Order No. 1.

The following criteria are used to determine if the BLM will convert abandoned oil and gas wells or exploration test holes into water wells:

> Wells with artesian flow have priority for funding by the BLM.
>
> Water quality must at least meet Wyoming state standards for surface discharge.
>
> For the project to receive priority for BLM funding, the well should be located in an "I" category allotment, be located so that it can service an "I" category allotment, or be in a habitat management area.
>
> The water development must help to achieve the objectives for the allotment.
>
> The new water source should be at least 1 mile from existing reliable waters.

The BLM will not normally fund wells that do not meet these criteria. However, if the location of a water well is particularly advantageous, the BLM will consider funding nonflowing wells or wells within 1 mile of existing water sources. When the well is located in an "M" or "C" category allotment and/or the permittee/lessee wishes to fund the project, the well must meet the water quality criteria and help meet AMP and HMP objec-

tives. The BLM will reserve all water rights, and the project must be authorized under a cooperative agreement.

All conversions of oil and gas wells or exploration test holes into water wells will meet the standards and requirements of the Wyoming State Engineer's Office and the Wyoming Oil and Gas Conservation Commission.

If the BLM decides to acquire a well as a water well, it must assume responsibility at the time of abandonment. The operator will plug the well at the bottom of the desired fresh-water zone and leave casing in place. The operators then will begin surface cleanup as required. The BLM may reimburse the operator for any recoverable casing or surface equipment to be left in or on the hole.

GLOSSARY

[Terms in italics are defined in this Glossary.]

ACCELERATED SOIL LOSS. Soil loss that is a direct or indirect result of historic and present human activities. Accelerated soil loss is that which occurs in addition to the soil loss attributable to natural processes acting on undisturbed landscapes.

ACCIPITER. Any hawk of the genus Accipiter, which is composed of small and medium-sized hawks that have rather short wings and comparatively long legs and tail and usually fly low, darting in and out among trees.

ACRE-FOOT. The amount of water required to cover one acre to a depth of one foot. An acre-foot equals 43,560 cubic feet or 325,851 gallons.

ACTIVE PREFERENCE. Total annual authorized livestock grazing use, measured in animal unit months of forage use.

ALLOTMENT. An area of land designated and managed for livestock grazing.

ALLOTMENT CATEGORIZATION. The grouping of livestock grazing allotments into the categories "M" (maintain current satisfactory condition), "I" (improve current unsatisfactory condition), and "C" (manage custodially while protecting existing resource values). The criteria used to determine the categorization are described in appendix G.

ALLOTMENT MANAGEMENT PLAN. A documented program that applies to livestock operations on the public lands.An AMP is prepared in consultation, cooperation, and coordination with the permittee(s), lessee(s), or other affected persons.

ALLUVIUM. Unconsolidated rock or soil material deposited by running water, including gravel, sand, silt, clay, and various mixtures of these materials.

ANIMAL UNIT MONTH. The amount of forage necessary to sustain one cow, one horse, five sheep, 9.6 antelope, 5.8 deer, or 1.9 elk for one month.

ANTICLINE. A geological structure in the form of a sine curve or elongated dome. The formation is favorable to an accumulation of oil and/or gas.

AQUIFER. A water-bearing bed or stratum of permeable rock, sand, or gravel capable of yielding considerable quantities of water.

ARCHAIC PERIOD. The cultural period (defined by Frison [1978] for the Northwest Plains) which separates the Paleo-Indian and Late Prehistoric periods. The Archaic Period is subdivided into three cultural periods: Early Plains Archaic (8,000 to 4,500 years BP—indicated by small lanceolate and large side-notched projectile points and by an apparent increase in the use of grinding stones), Middle Plains Archaic (4,500 to 2,500 years BP—indicated by McKean Complex tools and by the appearance of stone circles and corner-notched projectile points), and Late Plains Archaic (2,500 to 1,500 years BP—indicated by the Pelican Lake and Beson complexes).

AREA OF CRITICAL ENVIRONMENTAL CONCERN. An area within the public lands designated for special management attention to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.

AVERAGE FIVE-YEAR LICENSED USE. The average amount of livestock grazing on public lands in the planning area that has occurred during the past five years.

AVOIDANCE AREA. Areas on public lands where rights-of-way may be granted only when no feasible alternative route or designated right-of-way corridor is available.

BENTONITE. A clay formed by the decomposition of volcanic materials, having the ability to absorb large quantities of water and to expand to several times its normal volume. It is a locatable mineral having a variety of uses, including use as an oil well drilling fluid.

BEST MANAGEMENT PRACTICE. A practice, or a combination of practices, determined by a state or a designated planning agency to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

BIOMASS. The sum total of living plants above and below ground expressed in pounds per acre.

BROWSE. As a noun, that part of the current leaf and twig growth of shrubs, woody vines, and trees available for animal consumption. As a verb, to consume such vegetation.

CANDIDATE SPECIES. An animal or plant that may be designated threatened or endangered in the near future. This status offers no legal protection under the Endangered Species Act of 1973.

CAVE SYSTEM. A group of caves in the same drainage or area that are affected by a similar set of circumstances, such as water flow. The caves may or may not be physically connected, although the probability is good that they are connected.

CLASSIFICATION AND MULTIPLE USE. Refers to both the Classification and Multiple Use Act of 1964 and the classifications that were placed on the lands pursuant to that act. The objective of the C&MU act was to provide an opportunity for the BLM to categorize lands for multiple use management and for disposal. The act provided four years for the BLM to classify lands for multiple use management by prohibiting disposal or entry under various public land laws and mineral laws to be specified in the particular classification document.

The C&MU classifications referred to in this document prohibited disposal under the Isolated Tracts Act (Revised Statutes 2455) and entry under the agricultural entry laws (Homestead Act, Desert Land Act, and others); portions of the C&MUs also prohibited entry under the General Mining Law of 1872. Today, the multiple use provisions of FLPMA fulfill the purpose and objectives of the C&MU classifications.

CLEAR-CUT. The removal of an entire stand of trees in one cutting. Reproduction is obtained artificially, by natural seeding either from adjacent stands or from trees cut in the clearing operation. This harvest method creates a new even-aged stand of trees.

CLIMAX PLANT COMMUNITY. The final vegetative community that emerges after a series of successive vegetational stages. It represents the highest ecological development of a plant community capable of perpetuation under the prevailing climate and soil conditions.

COMMERCIAL FORESTLANDS. All forestlands that are capable of yielding at least 20 cubic feet of wood per acre per year from commercial tree species.

CORD. A unit of measure of wood volume. A cord is the amount of cut logs or wood in a stack measuring 4 by 4 by 8 feet.

CORRIDOR. A strip of land in which one or more existing or potential facilities or rights-of-way may be located. A designated corridor is the preferred location for existing and future right-of-way grants that has been identified by law, by Secretarial Order, through land use planning, or by other management decision.

CRAWLWAY. As used in reference to caves, a cavern passage too low for stooping.

CRUCIAL RANGE. Range on which a wildlife species depends for survival. No alternative ranges are available because of climatic conditions or other limiting factors. Crucial range may also be called critical or essential range for the welfare and survival of a threatened or endangered species.

CULTURAL RESOURCE. The fragile and nonrenewable remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred even though evidence of the event no longer remains, and (3) the environment immediately surrounding the resource.

DECORATION. As used in reference to caves, any mineral deposit formed in a cave. Also known as a *speleothem.*

DESERTIC. Belonging to, peculiar to, or having the distinctive character of, a desert.

DISPOSAL. Transfer of ownership of a tract of public land from the United States to another party through sale, exchange, transfer under the Recreation and Public Purposes Act, or desert land entry.

ECOLOGICAL CONDITION. The present state of vegetation of an ecologic site in relation to the climax plant community for that site. Ecological condition is expressed as excellent, good, fair, or poor.

ECOLOGICAL SITE. A distinctive geographic unit that differs from other kinds of geographic units in its ability to produce a characteristic natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is capable of supporting a native plant community typified by an association of species that differs from that of other ecologic sites in the kind or portion of species or in total production.

ENDANGERED SPECIES. Any plant or animal species that is in danger of extinction throughout all or a significant portion of its range, as defined by the U. S. Fishing and Wildlife Service under the authority of the Endangered Species Act of 1973, as amended.

ENDEMIC. Belonging or native to a certain region; not introduced.

EROSION TOLERANCE. See *Soil Loss Tolerance.*

EXTENSIVE RECREATION MANAGEMENT AREA. An area where dispersed recreation occurs and where visitors have the freedom of recreational choice with minimal regulatory constraint. Significant public recreation issues or management concerns usually are limited in these areas.

FEDERAL LANDS. As used in this document, lands owned by the United States, including mineral estates underlying private surface, without reference to how the lands were acquired or what federal agency administers them.

FIRE FUEL. The living and dead vegetative material that can be consumed by fire.

FIRE MANAGEMENT PLAN. A source document containing fire history, ecological impacts, and proposed fire actions for manageable units of public lands.

FIRE MANAGEMENT. The use of full suppression, limited suppression, and prescribed fire to achieve desired management objectives.

FIRE PITS. The remains of cooking fires, food processing pits, or hearths indicated by concentrations of charcoal and/or fire-altered or cracked rocks in a confined area. Commonly basin or bowl-shaped depressions excavated one or two feet below the occupied surface.

FLOODPLAIN. The nearly level alluvial plain that borders a stream and is subject to inundation (flooding) during high water.

FLOWSTONE. Layers of travertine formed from water flowing in a very thin sheet that has deposited calcium carbonate.

FORAGE. All browse and herbaceous foods that are available to grazing animals. It may be grazed or harvested for feeding.

FORB. A flowering plant whose aboveground stem does not become woody and is not grass or grasslike.

FORESTLAND. Lands that are capable of supporting a desirable tree species with at least a 10% crown closure.

FULL SUPPRESSION. Taking aggressive action on all fires on or threatening the public lands with sufficient forces to contain the fire during the early burning period.

GALLINACEOUS. Resembling a bird of the order Galliformes; for example, a grouse or a domestic chicken.

GEOMORPHOLOGY. The branch of physiography and geology that deals with the form of the earth, the general configuration of its surface, and the changes that take place in the evolution of landforms.

GRAZING PREFERENCE. The total number of AUMs of livestock grazing on public lands apportioned and attached to base property owned or controlled by a permittee or lessee.

GRAZING SYSTEM. A systematic sequence of grazing use and nonuse of an allotment to reach identified multiple-use goals or objectives.

GROUNDWATER. Water within the earth that supplies wells and springs.

GYPSUM. A widely distributed mineral (hydrous calcium sulfate) that is colorless when pure. It is used chiefly as a soil conditioner, as a retarder in portland cement, and in making plaster of paris.

GYPSUM ANGEL HAIR. Fibrous growths of gypsum resembling white hair.

GYPSUM FLOWERS. Curved, twisted crystal growths of gypsum resembling flowers.

HABITAT. The place where animals or plants normally live, often characterized by a dominant plant and co-dominant form (for example, pinyon-juniper habitat).

HAZARDOUS WASTES. Those materials defined in Section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and listed in 40 CFR 261.

HYDROCARBONS. Organic chemical compounds of hydrogen and carbon atoms that form the basis of all petroleum products, including oil and gas.

HYDROGEN SULFIDE. A colorless, flammable, very poisonous gas that has a disagreeable odor suggestive of rotten eggs.

INHOLDINGS. Parcels of land of one ownership surrounded by or included within lands of another ownership.

INTERDISCIPLINARY. Characterized by participation or cooperation of two or more disciplines or fields of study.

INTERSEEDING. In forest management, placing of seed in specific spots in partially stocked stands done for the purpose of bringing the stocking level up to acceptable levels (adequate stocking is considered to be 300 established trees per acre).

KARST. A type of topography that results from dissolution and collapse of limestone, dolomite, or gypsum beds and is characterized by closed depressions or sinkholes, caves, and underground drainage.

KNOWN GEOLOGIC STRUCTURE. As defined in 43 CFR 3100.0-5(k)(1), revision of 1984, "The trap in which an accumulation of oil or gas has been discovered by drilling and determined to be productive, the limits of which include all acreage that is presumptively productive."

LANCEOLATE. In reference to projectile points, long and slender without notching; as might be expected on a lance.

LEASABLE MINERALS. Minerals such as coal, oil shale, oil and gas, phosphate, potash, sodium, geothermal resources, and all other minerals that may be developed under the Mineral Leasing Act of 1920, as amended.

LEASE (MINERAL). A contract between an owner of mineral rights and another, granting the latter the right to search for and produce gas, hydrocarbons, or other mineral substances upon payment of an agreed-upon rental, and royalties based on production.

LEK. A site used by grouse for courtship display. Also called "strutting ground" or "dancing ground." The lek is the center point of the annual reproduction cycle. Most nesting occurs within 2 miles of the lek.

LIMITED SUPPRESSION. A deviation from normal fire suppression that is based on a fire land use decision or is practiced where controlling fire is extremely difficult or where the values-at-risk do not warrant the expense associated with normal suppression procedures.

LITHIC. Made of stone. In discussion of cultural resources, this term relates to human use of stone as a cultural tool.

LOCATABLE MINERALS. Minerals that may be developed under the Mining Law of 1872, as amended, such as bentonite, gypsum, and uranium.

LONG TERM. As used in this document, more than ten years.

MAINSTEM. The main course of a stream or river.

MITIGATIVE MEASURES. Actions that can be taken to lessen the adverse effects of proposed surface-disturbing activities on existing resources.

MODERN URBAN. One of the six classes of the *recreation opportunity spectrum*. In modern urban areas, opportunities to experience recreation in affiliation with individuals and groups are prevalent, as is the convenience of recreation sites and opportunities. Opportunities for wildland challenges, risk taking, and testing of outdoor skills are unimportant. Opportunities for competitive spectator sports are common, as are opportunities to use parks and open spaces highly influenced by people.

MONITORING. The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting developed management objectives.

MONOTYPE. The only representative of its group (as a single species constituting a genus).

MULTIPLE USE MANAGEMENT. The management of public lands and their various resource values so that they are used in the combination that will best meet the present and future needs of the people and maintain the environmental integrity of the land and its resources.

NEAR-ENDEMIC. As used in this document, plant species known to occur only in Wyoming and one other state.

OFF-ROAD VEHICLE. Any motorized vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain.

OFF-ROAD VEHICLE DESIGNATIONS. BLM designations used in this document are as follows:

Open areas are designated areas and trails where ORVs may be operated without restriction.

Limited areas are designated areas and trails where the use of ORVs is subject to restrictions such as limits on the number or types of vehicles allowed or the dates and times of use, limit of use to existing roads and trails, or limit of use to designated roads and trails.

Closed areas are areas and trails where the use of off-road vehicles is permanently or temporarily prohibited. Emergency use of vehicles is allowed.

OVERBURDEN. Material of any nature that overlies a deposit of useful materials such as bentonite or coal.

OVERMATURE. Of timber, stands which the annual growth rate falls below the mean annual increment. This occurs when mortality in the stand starts to exceed the acceptable level of growth.

OVERSTORY. The layer of foliage in a forest or shrub canopy.

PALEO-INDIAN. Classification for archeological remains of early aboriginal inhabitants of the Americas generally dating to before 8,000 years BP.

PALEONTOLOGY. The geologic science dealing with the plant and animal life of past geological periods as known from fossil remains.

PALUSTRINE. Living or thriving in a marshy environment; being or made up of marsh.

PARTURITION HABITAT. Area where a species gives birth to young. Also see *production habitat.*

PETROGLYPH. A carving or inscription on a rock.

PHREATIC. Adjective indicating a relationship to water in the zone of saturation under water-table conditions related to groundwater.

PLANNING AREA. Not synonymous with *Resource Area.* See chapter 1 for detailed description.

POPULATION. All the individuals belonging to a single plant or animal species occupying a particular area of space.

PRECOMMERCIAL THINNING. An operation performed in even-aged stands of saplings that have no commercial value. The objective is to redistribute growth potential in a well-spaced residual stand.

PRIMITIVE. One of the six classes of the *recreation opportunity spectrum.* Primitive areas offer recreation opportunities for isolation from the sights and sounds of human activities, where a visitor can feel a part of the natural environment, experience a high degree of challenge and risk, and use outdoor skills.

PRIMARY (FULL) BODY CONTACT. Any recreational or other surface water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard (for example, water skiing and swimming).

PRODUCED WATER. Salt water produced with the oil from a well. When large quantities of salt water are produced on a lease, the water is pumped into a deep disposal well.

PRODUCTION HABITAT. Habitat in which young are produced. Nesting or birthing habitat. Also see *parturition habitat.*

PROTOHISTORIC. Brief period forming transition between prehistoric and historic periods in Plains Indian archeology and history.

PUBLIC LAND. As used in this document, surface or mineral estate administered by the BLM. Also see *federal lands.*

RADON. A heavy radioactive gaseous element of the group of inert gases formed by disintegration of radium.

RANGE CONDITION. See *ecological condition.*

RANGE SITE. A distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce native plants.

RAPPELLING. The act or method of moving down a steep incline by means of a double rope secured above and placed around the body and paid out gradually.

RAPTOR. Bird of prey.

RECOVERY HABITAT. An area with habitat characteristics that would support a sensitive wildlife species but where the species does not now exist.

RECREATION AND PUBLIC PURPOSES. R&PP refers to both the Recreation and Public Purposes Act (43 USC 869 (a)) and the uses to be made of public land transferred under the act. The objective of the R&PP Act is to meet the needs of state and local government agencies and nonprofit organizations by leasing or conveying public land required for recreation and public purpose uses. Examples of uses made of R&PP lands are parks and greenbelts, sanitary landfills, schools, religious facilities, and camps for youth groups. The act provides substantial cost benefits for land acquisition and provides for recreation facilities or historical monuments at no cost.

RECREATION OPPORTUNITY SPECTRUM. A continuim used to characterize recreation opportunities in terms of setting, activity, and experience opportunities. Six classes are included: *primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural,* and *modern urban.*

RECREATION VISITOR DAY. An aggregation of 12 visitor hours. A visitor hour is the presence of one or more persons on land and water for outdoor recreation for periods totaling 60 minutes; for example, one person for one hour, two persons for one-half hour each, and so on.

RESOURCE AREA. A management unit of a BLM district. In this document, the Cody Resource Area, a management unit of the Worland District. The Cody Resource Area covers portions of Big Horn and Park counties. A detailed description appears in chapter 1, under the heading "Description of the Planning Area."

REST-ROTATION. A prescribed pattern of grazing use that provides sequential rest for various parts of the range unit for at least an entire year.

RIPARIAN HABITAT. A highly valued wetland vegetation community found along or around streams, lakes, ponds, and other open water (both perennial and intermittent). This unique habitat is crucial to the continued existence of many fish and wildlife species known to occur in the area. Riparian vegetation helps maintain high water tables, stabilize pond and streambanks, create quality fish and wildlife habitat, and maintain water quality.

ROADED NATURAL. One of the six classes of the *recreation opportunity spectrum.* Roaded natural areas offer about equal recreation opportunities for affiliation with other user groups or isolation from sights and sounds of human activities. Such areas provide the opportunity for visitors to have a high degree of interaction with the natural environment. Challenge and risk opportunities are not very important except in specific challenging activities. The practice of outdoor skills may be important. Opportunities for both motorized and nonmotorized recreation are present.

ROTATION AGE. The predetermined age at which a forest is to be harvested.

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RURAL. One of the six classes of the *recreation opportunity spectrum.* In rural areas, opportunities to experience recreation in affiliation with individuals and groups are prevalent, as is the convenience of recreation sites. These factors generally are more important than the natural setting. Opportunities for wildland challenges, risk taking, and testing of outdoor skills are unimportant except in activities involving challenge and risk.

SALABLE MINERALS. Minerals that may be sold under the Material Sale Act of 1947, as amended. Included are common varieties of sand, stone, gravel, and clay.

SECONDARY BODY CONTACT. Any recreational or other surface water use in which contact with water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal; for example, fishing, hunting, and commercial and recreational boating.

SCOPING PROCESS. An early and public process for determining the nature, significance, and range of issues to be addressed related to a proposed action.

SEASON OF USE. The part of the year in which livestock are authorized to graze in a given area.

"SECTION 15" GRAZING LEASE. A document authorizing use of public lands for livestock grazing outside grazing districts. The term refers to section 15 of the Taylor Grazing Act.

"SECTION 3" GRAZING PERMIT. A document authorizing use of public lands for the purpose of livestock grazing within grazing districts. The term refers to section 3 of the Taylor Grazing Act.

SELECTIVE CUT. A timber harvest system in which trees are removed in groups or strips or in single-tree selection. This method creates or maintains uneven-aged stands and creates space so that new trees can start and grow in height.

SEMIPRIMITIVE MOTORIZED. One of the six classes of the *recreation opportunity spectrum.* Semiprimitive motorized areas offer some opportunities for isolation from the sights and sounds of human activities, but this is not as important as opportunities for primitive recreation. Use of these areas involves the opportunity for visitors to have a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. Such an area provides an explicit opportunity to use motorized equipment while in the area.

SEMIPRIMITIVE NONMOTORIZED. One of the six classes of the *recreation opportunity spectrum.* Semiprimitive nonmotorized areas offer some opportunities for isolation from the sights and sounds of human activities, but this is not as important as opportunities for primitive recreation. Use of these areas involves the opportunity for visitors to have a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills.

SENSITIVE SPECIES.

Federal government definition: One of two groups of plants or animals.

> Those which could be appropriate for listing as threatened or endangered but for which data are not sufficient to be used in the listing process. These species need more study; or
>
> Those which are not being considered as candidates for the listing process but are known to be rare, site specific, endemic, or in potentially threatened land use areas.
>
> The BLM gives sensitive species the same consideration for protection as threatened or endangered species.

State of Wyoming definition: Wildlife species found in Wyoming that are in need of management emphasis because of human activities. Three levels of sensitivity exist:

> **Priority I:** Species in need of immediate attention and active management programs to ensure that extirpation or significant declines of breeding populations in Wyoming do not occur.
>
> **Priority II.** Species in need of additional study to determine whether intensive management is warranted or whether low levels of management would suffice (i.e., monitoring population trends and encouraging resource management planning and programs to accommodate the species' needs).Until warranted intensive actions are identified, such low levels of management should be implemented.
>
> **Priority III.** Species whose needs should be accommodated in resource management programs and planning. However, intensive management programs to enhance or maintain populations do not appear warranted under present conditions. They are species whose population and habitat trends should be monitored to determine if low levels of management continue to be adequate.

SERAL STAGE. The present state of vegetation of an ecological site in relation to the potential natural community for the site. Vegetation status is the expression of the relative degree to which the kinds, proportions, and amounts of plants in a community resemble those of the potential natural community. The classes are potential natural community, late seral, mid-seral, and early seral.

SETTLEABLE SOLIDS. Substances attributable to or influenced by human activities that will settle to form sludge, bank, or bottom deposits.

SHORT TERM. As used in this document, ten years or less.

SHUT-IN WELL. An oil or gas well is shut in when its wellhead valves are closed, shutting off production. Wells may be shut in for any of several reasons; for example, while waiting on a pipeline connection.

SINKHOLE. A hole formed in limestone by the action of water that serves to conduct surface water to an underground passage.

SOIL LOSS TOLERANCE. The relationship of soil loss (erosion) to soil development. Soil loss tolerance is the amount of topsoil that a soil can afford to lose annually and replace by new topsoil development, without declining in fertility and productivity. Also called *Erosion Tolerance.*

SPECIAL RECREATION MANAGEMENT AREA. An area where special management or intensive recreation management is needed. Recreation activity plans are required, and greater managerial investment in facilities or supervision can be anticipated.

SPELEOTHEM. A cave deposit or formation.

SPELUNKER. A person who explores caves.

SPLIT ESTATE. Surface and minerals of a given area in different ownerships. Frequently the surface will be privately owned and the minerals federally owned.

STALACTITE. A cylindrical or conical deposit of minerals, generally calcite or aragonite, hanging from the roof of a cavern.

STALAGMITE. Columns or ridges of carbonate rising from a limestone cave floor. It is formed by limey water dripping from the stalactites above.

SUBADULT. A plant or animal that has passed through the juvenile period but has not yet attained typical adult characteristics.

SUCCESSIONAL STAGE. In a succession, the sequence of communities is collectively known as a sere, while each community is a seral stage, or sometimes a developmental stage or a pioneer stage. The stages in succession are arbitrarily defined, but in reality a given stage is part of a larger vegetational population forming a continuum in time and space. Stages can be identified on the basis of characteristic life forms exhibited by plant communities.

SUPPLEMENTAL FEED. A feed which supplements the forage available from the public lands and is provided to improve livestock nutrition or rangeland management.

SUSPENSION. The act of temporarily withholding, in whole or in part, a grazing preference from active grazing use.

SUSTAINED YIELD. A silvicultural practice in which the volume of wood cut is equal to growth over the long run.

THREATENED SPECIES. Any plant or animal species that is likely to become an endangered species throughout all or a significant portion of its range, as defined by the U. S. Fish and Wildlife Service under the authority of the Endangered Species Act of 1973, as amended.

TIMBER PRODUCTION BASE. Commercial forestlands determined to be capable of sustaining timber production over time. Suitability is determined through the timber production capability classification process.

TOTAL SUSPENDED PARTICULATES. All solid or semisolid material found in the atmosphere; for example, dust.

TREND. The direction of change in range condition over a period of time, expressed as upward, downward, or static. The factors that influence trend are changes in plant composition, abundance of young plants, plant residues, plant vigor, and the condition of the soil surface.

208 WATER PLAN. A water quality management plan developed by an agency of each state—in Wyoming, the Department of Environmental Quality. Called "208" from the section number of the Federal Water Pollution Control Act of 1972 and 1977 (also called the Clean Water Act). Section 208 of that act specifies how a continuing process of water quality management is to be used to meet the goals of the law and how boundaries of area-wide regions are to be determined. It establishes procedures to be used by each state in designating an agency to develop the plan and identifies issues to be addressed in the plan.

UNGULATE. A hoofed mammal; for example, deer, elk, or domestic cattle.

UTILIZATION. The portion of the current year's production that is consumed or destroyed by grazing animals. The term may refer either to a single species or to the vegetation as a whole.

VIEWSHED. The landscape that can be directly seen under favorable atmospheric conditions from a viewpoint or along a transportation corridor.

VISUAL RESOURCE MANAGEMENT. The planning, designing, and implementation of management objectives for maintaining scenic value and visual quality on public lands. The BLM's VRM system is described in appendix H.

WATERSHED. A total area of land above a given point on a waterway that contributes runoff water to the flow at that point.

WETLAND. Lands where at least periodic inundation or saturation with water (either from the surface or subsurface) is the dominant factor determining the nature of soil development and/or the types of plant and animal communities living there. These include the entire zones associated with streams, lakes, ponds, springs, canals, seeps, wet meadows, and some aspen stands. Wetlands, which occupy about 1% of the public land acreage in the planning area, support all the fish in the planning area. They also support more wildlife at higher densities than any other habitat type.

WILD HORSE HERD AREA. The area utilized by wild free-roaming horses and burros as all or part of their habitat at the date of passage of the Wild Free-Roaming Horse and Burro Act (Dec. 15, 1971).

WILD HORSES. All unbranded and unclaimed horses and their progeny that roam public lands or that use those lands as all or part of their habitat after December 15, 1971.

WITHDRAWAL. Actions that restrict the use of public land and segregate the land from the operation of some or all of the public land and/or mineral laws. Withdrawals are also used to transfer jurisdiction of management to other federal agencies.

WOODLANDS. Lands producing tree species that are not typically utilized as sawtimber products and are sold in units other than board feet (for example, pinyon and juniper). Woodlands are not included in the commercial forestland allowable cut base.

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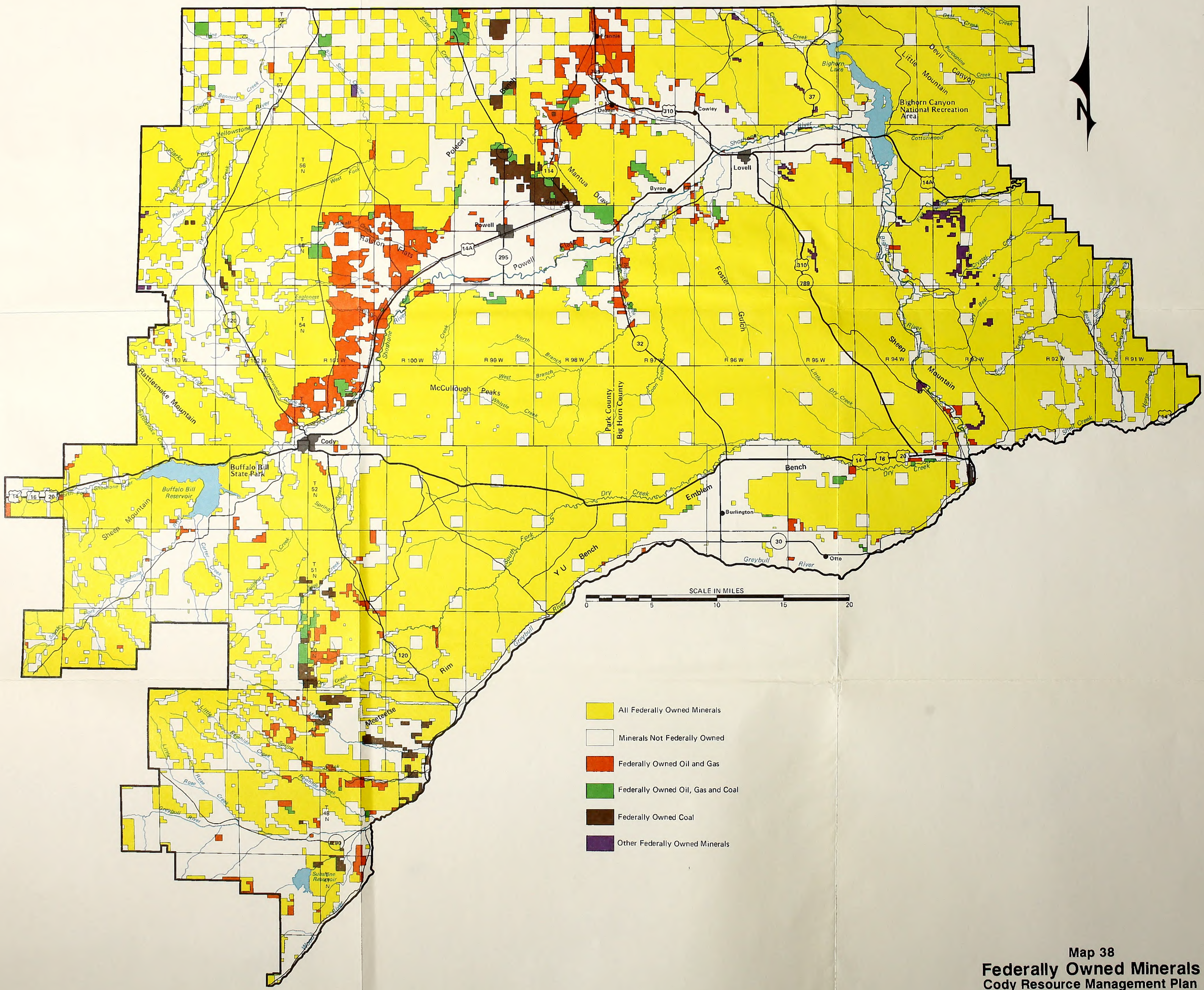


Map 38

Federally Owned Minerals

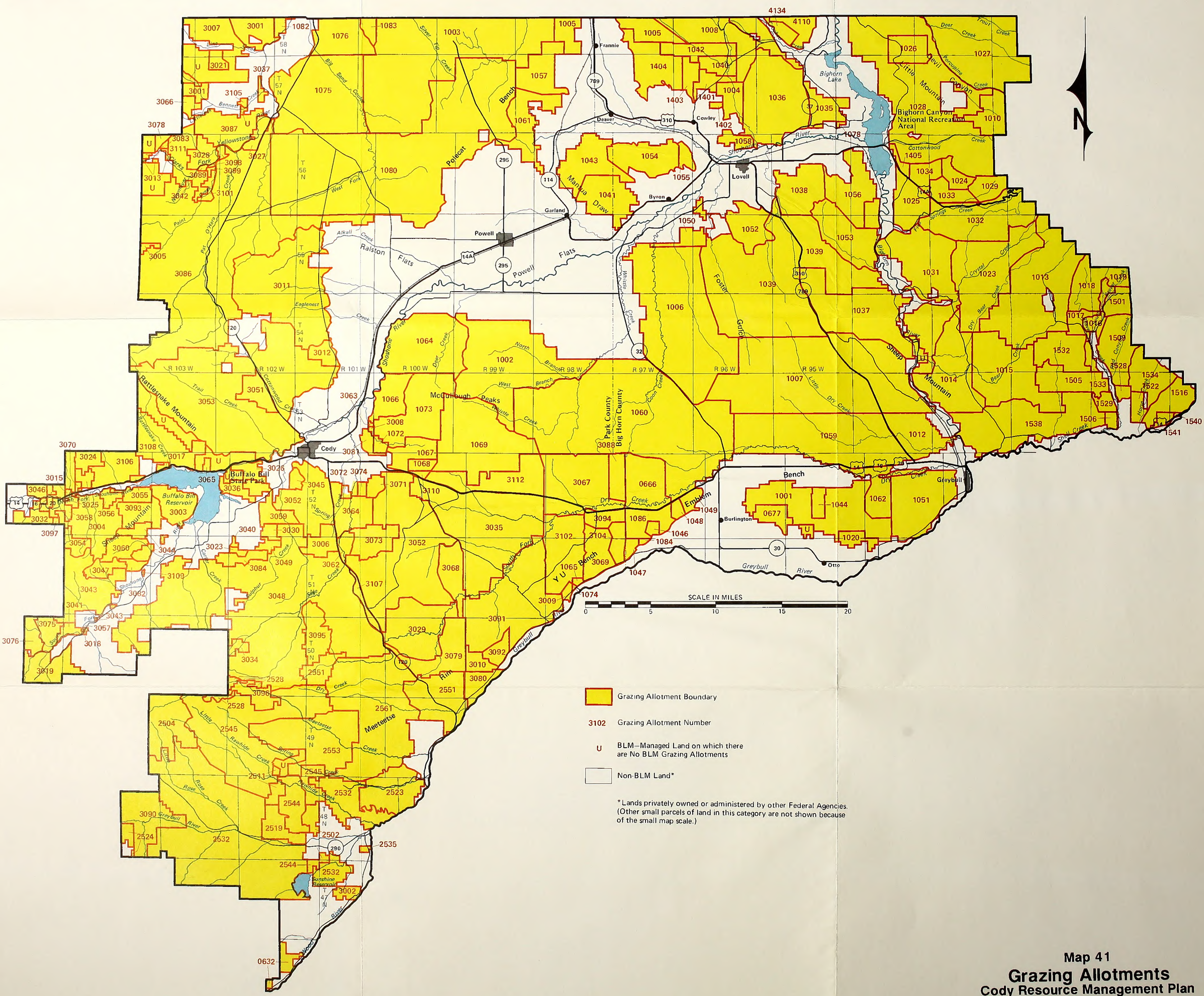
Cody Resource Management Plan

N

SCALE IN MILES
0 5 10 15 20

- BLM-managed Public Land
- Land under State of Wyoming Jurisdiction
- Private Land
- Land Managed by National Park Service
- Bureau of Reclamation Withdrawal
- Other Withdrawn Land (Military, Power Site, Public Water Reserve)

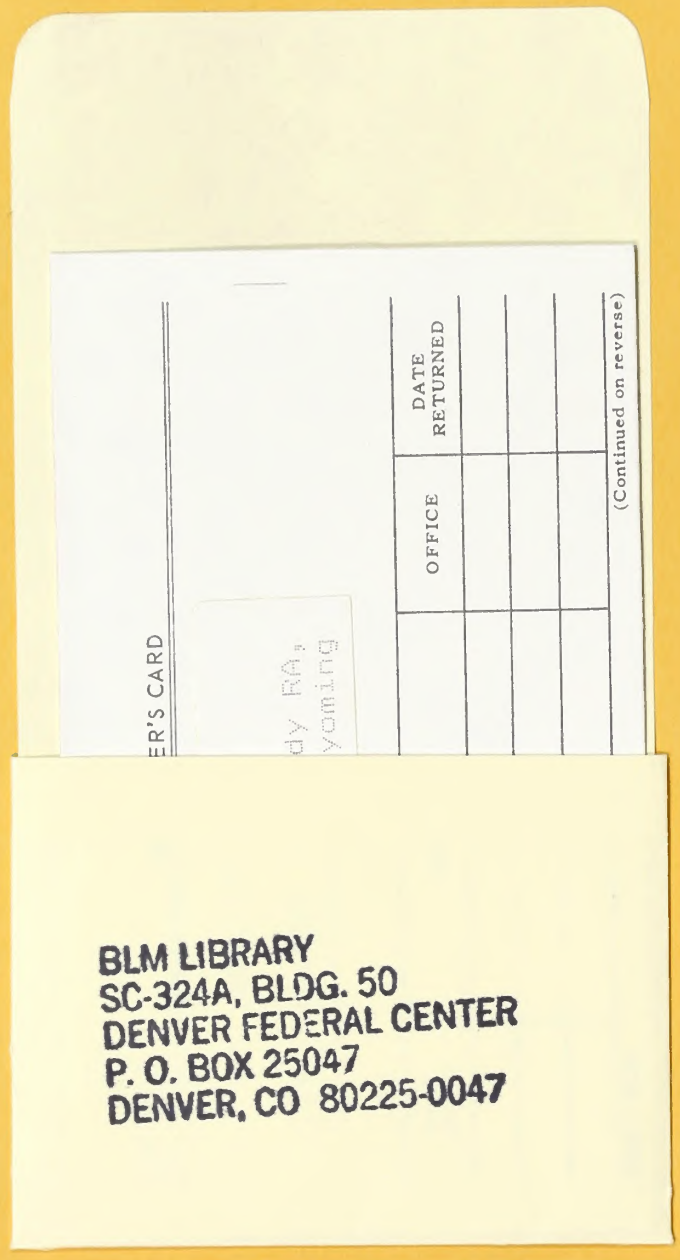
Map 40
Landownership
Cody Resource Management Plan



Map 41

Grazing Allotments

Cody Resource Management Plan



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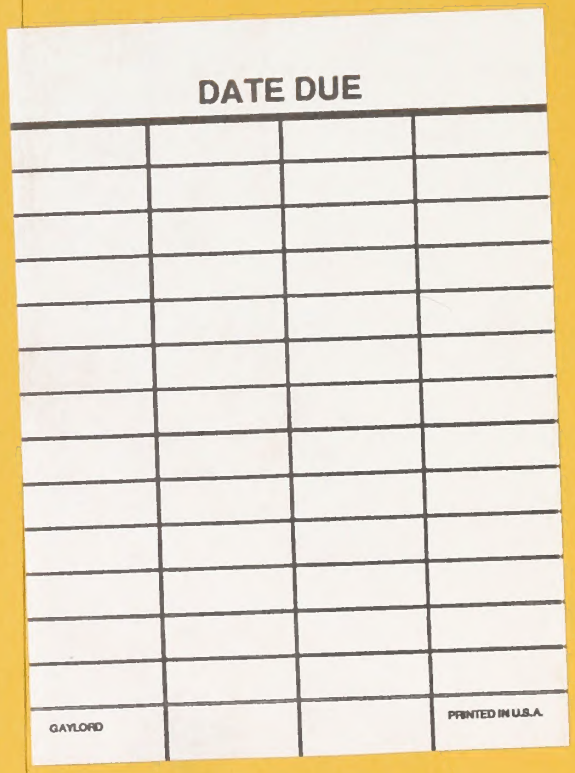

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities for most of our nationally owned public lands and natural resources. This responsibility includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses the nation's energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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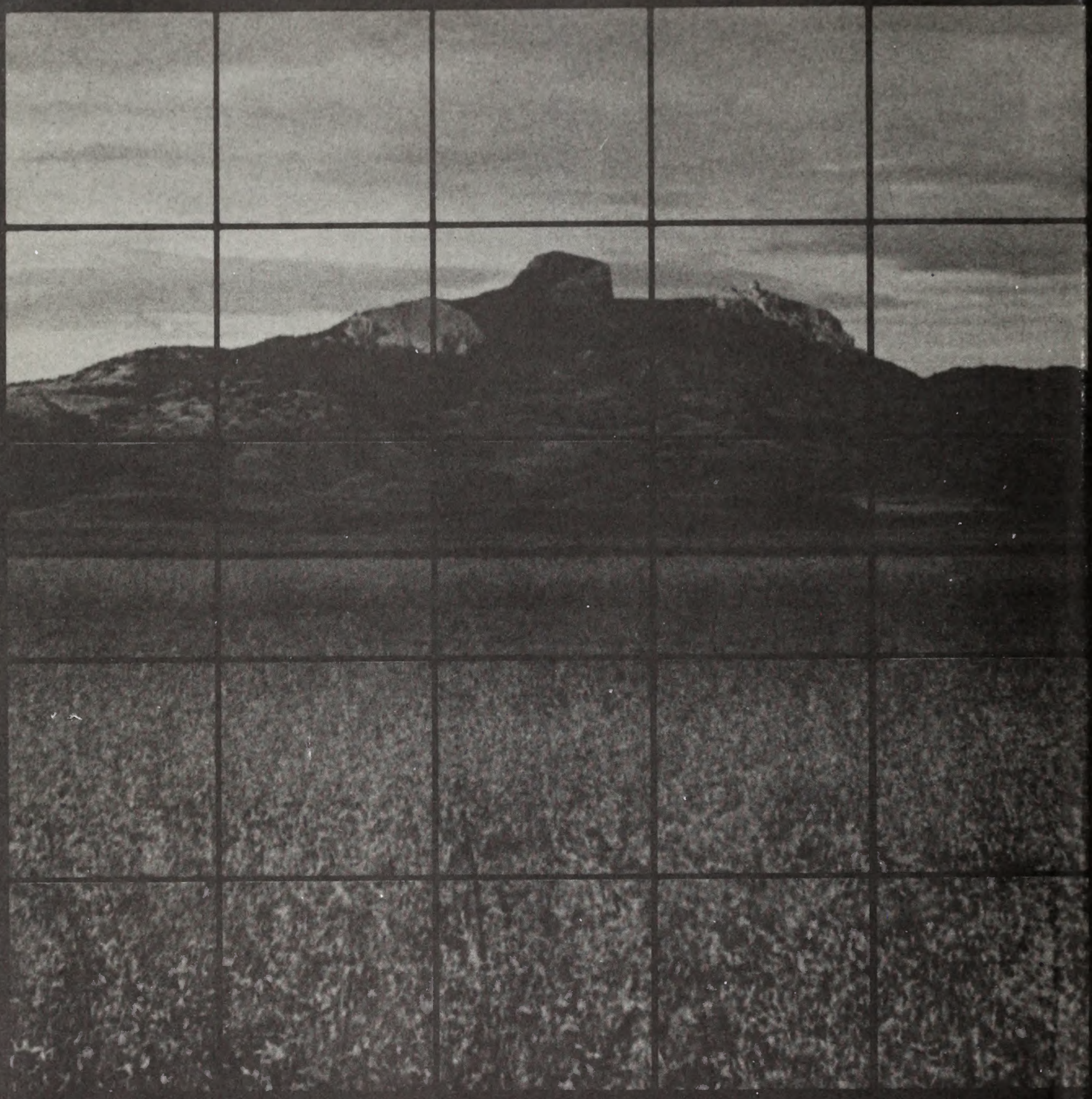

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